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FICTION

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ABOVE: Boba Fett stands surrounded by his fellow bounty hunters. (Art by Stephen Yount.)

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Science Fiction, sci-fi and SF needn't fight an intergalactic war.

YOU WOULDN'T HATE ME IF I TOLD you that I loved both chocolate and vanilla ice cream, would you? No, after five years I know you better than that, you wouldn't. I'm sure of it. So why is it that I'm made nervous at the thought of asking you a similar question with a slightly different twist? I'll pose it now a bit trepidatiously to all the science fiction fans out there (wait a moment while I take a deep breath to calm myself down) — Will you still love me if I tell you that I also love sci-fi?

There, I said it! Some of you may be shaking your heads and saying, "It's the same thing, isn't it?" Others of you, who have done your time in the genre's trenches, will be nodding instead, knowing full well the interfamilial conflicts which occasionally arise within this field of ours.

I've been thinking about this quite a bit since I took over the editorial reins of a second *Sovereign Media* magazine. Six months ago, I began editing *Sci-Fi Entertainment*, the official magazine of the Sci-Fi Channel, in addition to my work here on our flagship title *Science Fiction Age*. *Sci-Fi Entertainment*, for those of you who may not have yet had the good fortune to see an issue, concerns itself almost entirely with the mass media aspects of science fiction, devoting itself primarily to movies and television, as opposed to our pages here, where our concerns take a more literary bent (though with a constantly roving eye for the other, more visual aspects of the genre). I've been having a ball wearing that different hat, gathering behind-the-scenes info on the hot new movies and television shows, and that has me worried.

What worries me may surprise you. Because what worries me is that I am not worried about it. Let me try to clarify that conundrum for you.

I have been going to conventions since 1970, with my first World SF Convention in 1974. So I've had many years to watch the way things work in the world of science fiction fandom. One of the first things I learned was that there is not but one fandom, but many. Every convention has many smaller unacknowledged conventions going on inside of them. If you look closely here, and peek over my shoulder, you can see them.

First, take a look over here — you'll see the fans who love only the written word, who go to attend panels discussing the intricacies of plot and story, to buy and sell old books and magazines, and to talk about their favorite authors. Then, over there, there are the film

fans, who lock themselves in the movie rooms and spend the convention in the dark, watching the best (and often the worst, which can sometimes be even better) that television and the cinema can provide. The gamers bring along their cards and dice and painted pewter figurines, trying their best to live the dreams. Then there are the comic book fans, the costumers, the would-be writers, and the myriad other subcultures of science fiction.

If you look closely, you'll see that though they occupy the same hotel and convention space, they don't seem to talk together too much. These hidden worlds enjoy a peaceful coexistence, but they don't seem to cross over too often.

Fans of the written word often claim that the media fans aren't serious enough. Fans of movies and television sometimes think the print fans take themselves far too seriously. They eye each other suspiciously, sure that theirs is the only true science fiction.

And here I am, with a foot in each camp, unaffiliated and serene, straddling a great divide. And why am I unworried and unafraid?

Because I'm hoping to change that. Here's my guilty secret —

I like reading the best prose SF from our finest writers, and I even try to publish some of it here in these pages. But I also like watching *Babylon 5*. And I like playing computer games and cruising the Internet as well. What does that make me? I'd like to think well-rounded, though some might call it indecisive. But what's wrong with wanting the best of everything? Nothing. I think there are others just like me out there.

The thing to remember is that there's good and bad in SF, but also within each of our subgenres. And sometimes the bad seems to overwhelm the good, at least to outsiders.

Which means that print fans are upset that movie buffs would choose a bad movie over a good book. And film mavens are bothered that novel lovers would read a bad novel instead of seeing a great movie. It's time for us all to broaden our horizons, and to skim the cream off the top of SF, wherever that may take us. That's what *Science Fiction Age* and *Sci-Fi Entertainment* are all about. That it is possible to be indiscriminating, and to love science fiction in all of its many incarnations, as long as it's the best.

There, I've said it. I've gotten it off my chest, and I feel so much better now. I love science fiction, SF, sci-fi, spec fic, and skiffy, too.

Now it's your turn. □

Scott Edelman

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Mr. Edelman:

I found myself drawn to Charles Sheffield's "The Lady Vanishes" in your November issue. As you are well aware, science fiction stories using invisibility as a theme date back well over 100 years. To my knowledge, however, few such stories feature a woman as an invisible protagonist or antagonist. I enjoyed Mr. Sheffield's interesting twist on this old subgenre very much.

As I read the story however, I found myself wondering about the type of energy source used to provide power for the numerous silicon sensors, liquid crystal displays, and microprocessors embedded in Dr. Doberman's invisibility suit. Given Dr. Doberman's desire to baffle her employer's security forces coupled with the speed and movement limitations imposed by her suit, she would need an ample supply of power or risk reappearing at an inopportune moment.

Respectfully yours,
Carl Thomas

The author responds:

There are a number of issues in "The Lady Vanishes" where I thought I might get letters, but oddly enough, energy considerations were not among them.

I did not discuss the invisibility suit power requirements, or how they were satisfied. However, the suit's sensors require no power at all, since they just convert light energy to electrical signals. Also, today's microprocessors are very miserly with energy (a laptop computer normally uses most of its battery power driving the disk). Thus, the main power requirement comes from the crystal displays. For that, the suit can use ordinary re-chargable commercial batteries, perhaps worn in a belt around the waist. Even if they weighed ten or fifteen pounds they should not seriously hinder the wearer, and they would be enough for a few hours of operation.

Dear Editor:

The most remarkable thing about the conversation between Adrian Andrews and Geoffrey Landis in your November issue is its incredible irrelevance to the concrete, daily reality of the overwhelming majority of the human race and the future we are facing. At least Landis has enough sensitivity to ask the question, "who makes the decisions?" But neither he nor Andrews are capable of even considering the far more basic question: Whose interests do the decision-makers serve? Andrews' myopic conservative libertarian universe is one where everyone comes from the same background privilege as he

does (i.e., that dirty word, "class"). Even his aliens are Republicans whose universe isn't perturbed by race and gender discrimination, by the abuse of economic and political power of one privileged class over another. Just get rid of the bogeyman "government" and everything will be just fine. The 100,000 Americans who get injured or die on the job every year due to the negligence of their employers will miraculously disappear. The proliferation of child labor and sweat shops in this increasingly deregulated economy will just vanish. People can take care of themselves, he says. Ah, but Mr. Andrews and Mr. Landis are both terrified of direct democracy characterizing it with the very old and unsophisticated rubric of "mob rule." (It is also quite ahistorical, since director democracy has plenty of good historical legitimacy under the right conditions.)

The elitist disgust towards "the masses" is a commonplace within the SF community and betrays the hypocrisy within the rhetoric of conservative libertarianism. Andrews says "people can decide things for themselves" yet doesn't want those decisions made by the riffraff. What he really wants is Aristotle's philosopher-kings — decision-makers who are Adrian Andrews clones, defining the parameters of government according to their privileged little cocoon of a universe.

I am a child of the dismantled U.S. welfare system, a system that at its height was a pale, pathetic shadow of the weakest of European social welfare states. My mother and I were saved from living on the streets when I was nine. We were recipients until I turned 21. My mother also worked, since this was in the '70s, when welfare recipients could earn a limited amount of money without their benefits being penalized. The assistance we received was never enough for us to survive, so she had to supplement it by working at a laundromat every day. When the rules changed in the late '70s, disallowing any recipient to earn any money at all, my mother had to work under the table. We knew several families in the same situation.

The evil Democratic welfare state also allowed me to fulfill my dream to go to college. I am the only one in my working class family to have a college degree. I also acquired an M.A. because my department awarded me with a scholarship, due to my achievements as an undergraduate. After working for almost three decades at a textile mill with poor lighting, no elevators, little air and no air conditioning, my mother had to go on disability because of constant inhalation of felt dust from the draperies she had palpated while bent over an old sewing machine, sit-

ting on a small wooden chair. Without the assistance of the comparatively puny U.S. welfare state, I would be where my young cousins are today — in their early '20s or about to graduate from high school with few prospects of college assistance, and no prospects for a real job that provides decent benefits and a genuine future. The unemployment rate in my hometown is approximately 25%, and far higher among young people. I hate to think of where my mother would be had it not been for the feds.

I am not writing to defend the Democratic party, a party I have come to despise, a party that bears no substantial difference from the Republicans in its support of corporate welfare. I write to point out that people like me — and there are so many of us — do not exist in Adrian Andrews' world. And barely in Geoffrey Landis'. Andrews' historical ignorance aside, there will always be politics in our midst because human beings are by their very nature political animals. Politics is not just about "governing ourselves." Politics has always been about competing interests, conflict between the powerful and the powerless, and about the divisions within each. Some SF authors have looked at the world in a far more realistic, fundamental way than either of your conversants is capable of doing. But they are often drowned out by the irrelevant noise made by the ivory-tower (or ivory-spaceship) white boys living in a very tiny universe indeed, one that excludes the majority of the human race. And then they wonder why the ignorant masses have no respect for science fiction.

Sandra H. Necchi

Dear Editors:

Every issue your Science Forum section has several authors and/or scientists discussing lofty topics such as Faster-Than-Light Travel or the environment. I wonder if you could devote one Forum to something as mundane as urban congestion, traffic and transit. In this age of computers and space flight, I am increasingly struck by the contrast between conditions today and those futuristic visions of the '50s, with their gleaming towers and ubiquitous monorails.

Obviously, we haven't arrived there yet. Why not, and how can we?

Sincerely
Les Leist

Readers—please let us know how we're doing at: Letters to the Editor, Science Fiction Age, 441 Corbise Dr., Herndon, VA 20170, or e-mail to S.Elephant10@Gmail.Geis.Com, or use CompuServe address: 102746,2004.

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BOOKS

By Allen Steele, Paul di Filippo and Rachel Russell

Arthur C. Clarke invites us on a thrilling journey in his masterwork *3001: The Final Odyssey*.



ABOVE: Elizabeth Moon's military heroine Esmyr Svirin continues in a long SF tradition. BELOW: The newest *Odyssey* is a fitting capstone for a grandmaster's career.

A new novel by Arthur C. Clarke is always an event; he is, after all, one of the truly great SF writers of this century, an author whose reputation stretches beyond the genre. His latest book is all the more noteworthy in that, for all practical purposes, it's been nearly fifty years in the making.

3001: The Final Odyssey (Del Rey Books, \$25.00, 272 pages, hardcover) is the third sequel to *2001: A Space Odyssey*, both the novel and the motion picture. In 1948, Dr. Clarke wrote a short story, "The Sentinel," for submission to a fiction competition sponsored by the British Broadcasting Company. The story didn't win the contest, and the story wasn't published until 1951, when it appeared in a one-shot pulp magazine titled *10 Story Fantasy*; it was later included in Clarke's 1953 collection *Expedition to Earth*. Eleven years later, the film director Stanley Kubrick, hot off the success of *Dr. Strangelove*, approached Arthur

Clarke with the idea of making a science fiction film. The two men decided to loosely base the film, tentatively titled *Journey Beyond The Stars*, on "The Sentinel," yet unlike most SF movies either before or since, what eventually became known as *2001* was a true collaboration: the film was made virtually without a screenplay, with Clarke and Kubrick shooting memos back and forth to one another. While Kubrick made the movie, Clarke wrote the novel, often incorporating backstory material which didn't appear onscreen. The result was a two-headed beast, while the film was the best SF movie ever made (and still is, in this reviewer's humble opinion), the novel stood on its own, explaining things which were only touched upon by the movie.

Yet *2001* still left many unsettled questions. Fourteen years later, Dr. Clarke published a sequel, *2010: Odyssey Two*. Once again a film was made, although this time the movie's director, Peter Hyams, was following Clarke's lead. The 1983 film was respectable, albeit somewhat less spectacular, and although several mysteries posed by the original book/movie were solved, it seemed as if even more were posed. It seemed as if Clarke wanted answers, too, because he resolved to write a third volume; this time, he would have the benefit of the new information about Jupiter that everyone in the space community anticipated from NASA's upcoming Galileo space probe, due to be launched from a Space Shuttle in 1986. However, when the Challenger disaster forced Galileo off the shuttle manifest and onto an unmanned rocket, Clarke's final volume of the *2001* trilogy was delayed as well. Making the best of a bad situation, he wrote *2061: Odyssey Three* anyway. The third novel advanced the plot a bit further, but didn't really resolve anything; indeed, it felt less like the third leg of a trilogy than a temporary placeholder.

In 1996, after a grueling odyssey of its own, Galileo finally reached Jupiter, where it successfully dropped an instrument package into its upper atmosphere, then went on to explore the planet's dazzling moons. While JPL controllers (among them Galileo project engineer Gentry Lee, who had by now co-authored three sequels to Clarke's *Rendezvous With Rama*) were tending its success, Arthur Clarke canceled all appointments, stopped answering his mail, took the phone off the hook, and sat down to finish this short story-cum-movie-cum-odyssey-cum-trilogy-cum-saga once and for all.

Now it's 1997, and *3001: The Final Odyssey* has finally been published. It's well-worth the wait.

The new novel begins with an unexpected return to the first one: the recovery of the frozen corpse of Frank Poole, the astro-



THE LEATHER-BOUND MASTERPIECES OF FANTASY



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naut who was killed by the malfunctioning HAL 9000 computer during 2001. In the year 3000, Poole's body is found by a comet-miner near the orbit of Neptune; he is returned to cislunar space, where a millennium's worth of medical science is able to effortlessly restore him to life. Poole is able to cope with the fact that a thousand years have passed since his death; however, he's less capable of assimilating all the changes, both social and technological, which have occurred in his long absence. The solar system has been thoroughly explored. Earth is girdled by Star City, an artificial ring populated by millions of people, connected to Earth's surface by four enormous orbital elevators. Its inhabitants receive information directly through electronic skullcaps and nanochips implanted in the palms of their hands. Docile, gene-reconstructed dinosaurs serve as gardeners and children's playmates. The word "God" is now considered a mild obscenity, for pantheism

year. And the denouement, wholly unexpected and rather chilling, brings this saga to the closure it richly deserves.

There are, truth be told, some inconsistencies between the events in the novel and the original 2001; there would have to be, because it's highly doubtful that lunar explorers will discover an alien artifact on the Moon three years from now. As a result, Frank Poole's death during the Discovery mission now seems to have occurred sometime early in the 21st century, and there is no mention of the American-Soviet rivalry that formed a subplot to both 2001 and 2010. In the novel's afterword, however, Clarke says that 2010, 2061, and 3001 are actually variations on a theme, and really shouldn't be regarded as direct sequels to 2001. He also has some choice words for nitpickers: "It's fiction, stupid!"

There's also a long section in the back of the book in which Dr. Clarke explains his

as if Arthur has stepped out of the novel for a moment to say, "Look, here's a rather interesting notion..."

3001 is the best novel Arthur C. Clarke has written in years. The writing is sharp, the pace relentless, the descriptions both grand and graceful, the humor tastefully wry. Once more, we're treated to the sort of visionary sweep that attracted readers to his work in the first place. Forty-nine years isn't such a long time to wait for an epic like this; however, this reviewer can't wait to see what Dr. Clarke publishes four years from now.

Perhaps it'll be titled 30,001: So I Changed My Mind.

Allen Steele

The Black Sun, by Jack Williamson, Tor Books, hardcover, 352 pages, \$23.95

Nearly thirty years ago, in his August, 1967, review column for *Galaxy* magazine, Algis Budrys had occasion to comment on the reprinting of an early tale by Jack Williamson, "The Moon Era." Budrys claimed then that "The Moon Era" is about as close as one could get, I think, to being picked up in fact and transported to an alien world. You can see, smell and taste the jangly, mossy Moon of the geologic past into which the hero is swept.... Pushing for the continued relevance of Williamson's approach and subject matter in the face of the then-burgeoning New Wave, Budrys speculated that perhaps the story's appeal had something to do with a "specific sense for a certain kind of nobility."

Well, here we now are, SF and her readers, three decades and several literary and socio-technic revolutions later, and, incredibly, against all odds, Jack Williamson is still with us, laboring far beyond mere mortal duty. And the virtues that Budrys detected in him at what now appears to be only the midpoint of his record-setting, Hank-Aaron-magnitude career, still shine through: an ability to render hypersensual narrative illusions, and a predilection for having his characters exhibit valor under stress, in the face of the universe's indifference.

His career commencing in 1928 with the publication of "The Metal Man" in *Amazing*, Williamson is now himself eighty-nine years old and has consistently delivered fine fiction to us during every decade of modern commercial SF's existence. His last book appearance was in 1994 with *Demon Moon*, as potent a blend of dark science-fantasy as he had ever conjured. This year he places humbly in our hands — for Williamson has never been one to strut or boast or claim that he is leading the pack — a more straightforward SF tale, but one which still bears traces of his youthful fascination with Merriott's grotesqueries.

The Black Sun seems to alert us by its quintessentially Thirties title that it will be in the mode of those early sense-of-wonder expeditions to a strange otherworld place. But the reader will be misled if he expects some kind of simplistic retash of the *Skyrock* books of E.

From a thousand kilometers up, Star City looked like a gigantic metal band around Earth's equator, dotted with gantries, pressure domes, scaffolding holding half-completed ships, antennas, and other more enigmatic structures."

— 3001: The Final Odyssey

has long since replaced organized religion.

Although Poole is comfortable in his new role as the last survivor of the 20th century, he quickly becomes restless; he has few friends, becomes bored with his celebrity, and cannot easily visit Earth because of his body's acclimation to low-gravity. Before long, he decides to revisit the Jovian system, where Jupiter itself has been transformed into Lucifer, the Sun's dwarf companion (as chronicled in 2010). Poole undertakes this second voyage not so much to find out what happened after his death as to see how far humankind has come in the past millennium, yet it isn't long after he reaches Ganymede before a presence on nearby Europa — placed off-limits to humankind by the cosmic forces behind the mysterious black monoliths, again as related in 2010 and 2061 — reach out to him.

To reveal much more than this would be a disservice to the reader, so this reviewer will refrain from disclosing the best parts of the novel; let's just say that we meet some old friends again and discover that the monoliths aren't quite as benign as we once thought them to be. We also find exactly why Dr. Clarke delayed writing this book until Galileo reached Jupiter; one of the novel's best scenes couldn't have been written as accurately, nor as breathtakingly, without the information Galileo sent home early last

extrapolations on a chapter-by-chapter basis. Although it isn't necessary to do so, the reader may find this information most useful if he or she refers to it after they've read an individual chapter; it's here that they'll discover that even the most far-fetched, seemingly throwaway ideas are well-grounded in current scientific fact or theory. Yet this background data is anything but dry; it's almost

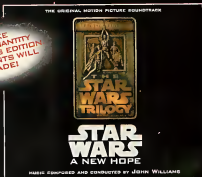


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E. Smith, Williamson is too honorable and deft for that plot. Instead, he manages to infuse a voyage to the stars with real claustrophobic terror and existential sadness, alleviated at the end only partially.

First, consider the environment in which Williamson's *StarSeed* Mission must operate: a deteriorating, desperate future Earth plagued by corruption and narrow-minded Luddite protesters. Hardly your joyous, amateur inventor, rocket-in-the-backyard scenario. Next, consider the actual method of interstellar travel. On the launch pad, the ship stuffed with supplies and fearful colonists is converted to a kind of probabilistic quantum froth. This information wavefront is now more or less randomly set adrift in the cosmos. When it enters a gravity well of sufficient density, it will recondense into its original life-bearing conformation. To the passengers, no time at all will have passed. In the outside universe, any number of years, from several to a billion will have gone by. If the people are

lucky, they will find themselves in a solar system with habitable planets, the huge task of colonizing still ahead of them. If unlucky, they will find themselves plunging into a black hole. In either case, there is no return across the gulf of time and space.

The destination to which Williamson delivers the crew of the final *StarSeed* mission is the Black Sun of the title, a guttering useless primary nearly dead. Its lone planet is a frozen waste dotted with alien ruins. Here is their promised paradise, the place where they must plant the seed of humanity.

Had any writer known for his sardonic pessimism — Michael Moorcock, say — given us this setup, readers would have braced themselves for a descent into entropic despair. But because of Williamson's innate style of hard-headed optimism, what we get instead is a tale of survival at all costs, akin to Stephen Baxter's *Flight* (1991) or John Campbell's *The Moon is Hell* (1951). There are tribulations aplenty, many of them at first seemingly insurmountable.

BOOKS TO WATCH FOR



Sci-Fi Private Eye, edited by Charles G. Waugh and Martin H. Greenberg (Penguin Roc). In the future there will still be crime, so thankfully there will also be crimefighters. A look at the future of detectives from the likes of masters Isaac Asimov, Poul Anderson, Larry Niven, Philip K. Dick and five others.

Promised Land, by Connie Willis and Cynthia Felice (Ace). The fourth collaborative novel from award-winning Willis and Campbell nominee Felice is set on the distant planet Keramos, where Delama must cope with the planet's bizarre laws and the even stranger Tardeton Tanner.

Fabulous Harbors, by Michael Moorcock (Avon). Housed in this volume's eleven interlocking stories are the continuing adventures of some of science fiction and fantasy's finest heroes, including the brooding prince Elric, the mysterious Rose von Bek, and Jerry Cornelius.

Bending the Landscape, edited by Nicola Griffith and Steve Pagel (White Wolf). A new anthology series examining gender with a genre eye. Contributors include Ellen Kushner, Mark W. Tiedemann, Leslie What, and Robin Wayne Bailey.

Creature Features: The Science Fiction, Fantasy and Horror Movie Guide, by John Stanley (Boulevard). A look at the best (and the worst) the filmed genre has to offer. To get any closer to the movies, you'd have to be eating popcorn.

The Dealings of Daniel Kesserich, by Fritz Leiber (Tor). A never before published missing masterpiece written in the '30s and lost in the '50s resurfaces in the '90s to make its triumphant publication debut. Inspired by the famed fantasy author's youthful correspondence with *Cthulu's* creator, H. P. Lovecraft.

John Jakes: A Critical Companion, by Mary Ellen Jones (Greenwood Press). His multi-volume *Bicentennial* series became a starting bestseller, but before he was taken over by the mainstream he was one of ours, with novels such as *Brak the Barbarian* and *Six-Gun Planet*.

The Outer Limits, Volume 3, edited by Debbie Notkin and Roger Stewart (Prima Press). Do not attempt to adjust your pages. Writers Richard A. Lupoff, Michael Marino and Diane Duane have taken control of your book to deliver the chills and thrills of the sci-fi TV show.

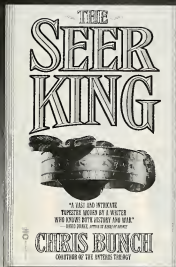
"I'd Just As Soon Kiss A Wookiee!" compiled by Stephen J. Sansweet (del Rey). This collection of the most memorable quotable quotes from *Star Wars* is a welcome addition to the film's 20th anniversary celebration.

Dead Things, by Richard Calder (St. Martin's). Dagon completes his trip around the universe, and returns to an Earth where both time and space are collapsing. The stunning conclusion to the wild trilogy that began with *Dead Girls* and *Dead Boys*.



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able, and the characters pay a real psychic price for their survival. But survive — and ever maybe ultimately prosper — they do.

The overall positive tone of this book is due to the fact that much of the narrative is carried on the shoulders of one Carlos Mondragon. Born a poor Mexican youth, he grows up unembittered and cheerful, a self-educated computer expert who manages to stow away on the last StarSeed flight. (Any resemblance to Williamson's own frontier youth and self-made stature is strictly empathetic.) Also on the flight as the necessary antagonists are the corrupt director of the whole program, several henchmen, and a double-agent saboteur, Jonas Roak, who functions rather like good old Doctor Smith on *Lost in Space* (1965-68), the snake in Eden.

One departure from Williamson's standard lineup of players is the absence of any Bad Girl. Williamson usually effectively evokes a lot of psycho-sexual tension from his hero by a dual attraction-repulsion to a Good Girl/Bad Girl pair. The Good Girl, Dr Rima Virgil, is here, along with two precocious kids, to act as love interest for Carlos. But without her "evil" doppelganger, Rima emerges as rather too sweet (like her namesake from Hudson's *Green Mansions* [1901]), and in fact nearly collapses by book's end, in my opinion an unfit mate for someone as rugged as Carlos.

It is in his depiction of the billion-year-old alien ruins that Williamson harks back to a very potent *Weird Tales* atmosphere. The discovery of a kind of temple on the shores of a frozen sea, its murals showing strange metamorphoses, brings the kind of frissons Lovecraft provided in *At the Mountains of Madness* (1936). Yet at the same time, Williamson can offer innovative speculations on what it might mean to jack into an alien cyberspace.

Never giving up, constantly questing, refusing to admit obsolescence, seeking to incorporate the new while retaining the best of the past — these phrases describe both Williamson the man and the books he happily offers us.

Paul Di Filippo

Once A Hero by Elizabeth Moon, Baen, 1997, 400 pages, \$21.00.

Science fiction loves heroes. The typical SF protagonist is a hero, not just an ordinary human (or alien). Besides being good-looking, the hero can do anything well — climb a mountain, ride a horse, tie knots. The typical hero knows the right thing to say in a board room, on a dance floor, or to a diplomat. Best of all are the heroes who don't know they are heroic, heroes who are just like us — shy, uncertain, scared — but who somehow do the right thing at the time, command respect from superiors, and loyalty from followers. Finally, there is the very latest hero to appear in science fiction, the hero with mental problems such as depression, low self-esteem, and family issues.

In the beginning, heroes were better than

Continued on page 97

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Alien ENCOUNTERS

Without the futuristic nightmare visions of H. R. Giger, many of your favorite science fiction films would not exist. He's the Swiss painter and sculptor who put the alien in *Alien*, terrifying a generation of film goers and winning

Art Books

himself an Academy Award in the

process. His most recent design work was for the sexy thriller *Species*, but even those films that were untouched by him directly exhibit signs of his influence, as SF movies have turned from hard-angled glittering tomorrows to organic biomechanical ones. *H. R. Giger's Design* (Morpheus International, \$49.50) is a 128 page compendium of every film and video project on which Giger has ever worked, including the ill-fated Jodorowski version of *Dune*. The 12" by 12" hardcover volume covers over a dozen films projects and contains over 300 reproductions, most of which are in full color and many of which have never before been published. Giger himself provides the text, detailing the history of each project, and *Alien* director Ridley Scott serves up an introduction. Collectors please note that a special slipcased and leather-bound limited edition of 300 copies, signed by Giger, is also available.



H. R. Giger (pictured with *Alien* director Ridley Scott, far right) re-invented the look of S.F. films, including *Alien* (above) and *Species* (right).



Cybersurfing the World Wide Web

Don't miss these Internet hot spots:
<http://members.aol.com/fandata/>
 "Reach out and touch someone," The Internet Fandom Directory is a browsable database with addresses for thousands of fans, conventions, zines, and businesses. It's

Web World very, uh, fanish. It looks like something put together by earnest, devoted people without much design sense. Like a program book at a Con. But hey, it's chock full o' data, so give it a visit.

http://ourworld.compuserve.com/homepages/monster_mayhem "Monster Nostalgia" Stoner's Monster Mayhem has the look and feel of those grubby newspaper catalogs of mass-press, bootleg and otherwise non-scheduled monster merchandise that you'd send away for out of the back of *Fangoria* and similar venues.

<http://entertain.com/store/welcome.html> "Filthy Lucre" The Intertain Bookstore is the online equivalent of one of those draughty, over-sized discount book warehouses you find in the better class of industrial malls. You can shop a fairly large catalog of 10% off new books, and the ven-



dor guarantees 24 day turnaround on orders. It lacks the romance of wandering the shelves, but if you know what you're looking for and can't make it out to your local superstore, it's worth a visit.

<http://www.mindspring.com/~mweaver/> "Ooh, pretty!" Michael Weaver, science fiction illustrator, has put up a personal gallery of his works. His pieces are striking, even when rendered as pixels instead of paint.

<http://www.crew.umich.edu/~brnck/poetry/manifesto.html> "Not as goofy as it sounds" Sci-falika is science-fiction haiku. At first glance, it seems like the

kind of silly word-game that science-fiction is full of (limericks, charlows, anagrams), but some of the pieces are quite beautiful and evocative. As for those that aren't, well, at least you didn't have to invest much time to find out you didn't like it.

<http://www.cinemaweb.com/sinister/> "Trash your video-card!" Never again will you have to brave the murky depths of the local Blockbuster. Sinister Cinema is a B-movie's best friend. This Oregon video distributor is your one-stop shop for low-budget flicks that can be yours — cheap.

<http://www.randomhouse.com/lurkerfiles/> "Killer Senal" The Lurker Files is a serial novel jointly presented by Random House and Yahoo!, written by Scott Ciencin. It's awfully good fiction, by Web standards, and good enough to pay for in paperback. The coolest part is that the audience has the opportunity to modify the storyline as it progresses, through a busy online forum.

Cory Doctorow

BABYLON ALIVE!

When I was eight I saw *Star Wars* twenty-one times," said Greg Aronowitz, creative director of the high-end collectible company Legends in 3 Dimensions. "That's when I knew what I wanted to be." Aronowitz has worked on over 120 films, designing costumes, special effects, sets and models for such projects as *Batman Forever*, *Terminator II*, and *Babylon 5*. Now **Collectibles** he's put his sculpting talents to work for you, rather than just the likes of Steven Spielberg. His latest limited edition product (only 1,500 will be made) is a 10-inch tall, cold cast porcelain bust of the Narn Ambassador G'Kar. Aronowitz and co-sculptor Bob Sherwood (pictured) are the perfect profilers, for they were the creators of this makeup for the pilot movie version. For further information, give them a call at 1-888-LEGEND3D.



Sci-Fi Funnymen

Of *Dr. Dimension*, the John DeChancie and David Bischoff space opera farce originally reviewed in our July 1993 issue, the equally zany Lionel Finn wrote: "Pure pulp action, all the character types you'd expect, and enough cliffhanger endings to keep

Audio you in Saturday matinees for a year." The satirical sci-fi novel transported mad scientist Dr. Demostrios Demopolous (aka Dr. Dimension) and his dim but eager assis-

stants from 1939 to an alternate timeline where they must defeat evil aliens, save the universe, and somehow find their way back to Earth. Now this comic concoction has itself crossed dimensions of a sort, turning from a wild text to an equally funny tape, thanks to the Hilton Head Island Repertory Company, who have transformed *Dr. Dimension* into a 6 hour radio play. Released by Ziplow Productions on four 90 minutes cassettes, the cosmic burlesque is lovingly brought to life — excruciating puns and all — by a large cast backed by original music and numerous special sound effects. Watch out — if this goes on, next thing you know there'll be a *Dr. Dimension* movie!



Dr. Dimension creates a new dimension in comedy. Art by David Mattingly.

A "New" New Hope

Like Skywalker was warned to avoid the Dark Side, but in one particular situation we think that even he would make an exception for something Dark — the Dark Horse publication of a special comic book adaptation of *Star Wars: A New Hope*, that is! Timed to coincide with the rerelease of the movie trilogy itself, the mini-series is

written by Bruce Jones and features art by Carlos Garzon and famed EC illustrator Al Williamson. As with the Special Editions of the film, there are new scenes, so that you will go back to a place you've never been before. The covers of the four installments by Dave Dorman (two of which are pictured at left) are individual masterworks, but also, once you've collected them all, they will fit together into a giant poster-sized montage image of the events of the first film. These full color 32 page comics are \$2.95 each, and available at finer comic book shops everywhere.



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MINEOLA, NY—Lucky Long Islander Pat Harris has encountered plenty of killer dogs on his postal route over the years, but never any killer space aliens—until now! "I was just minding my own business, delivering Mrs. Pansytopopoulos' mail when these space guys ask me if I want to go for a ride." Suddenly, Harris was transported to a bizarre bar full of creepy-crawly space critters! Then the wacky E.T.'s made Harris enter the minds of space port bar patrons—including a man-sized worm thing—so he could clues that ultimately led space police to a sheepstealing alien killer! Sadly, after returning from the minds of various noodle-like aliens, Harris is left with a life-long legacy of flashbacks that cause him to eat maggots and simulate molting. But for Harris, it's a small price to pay for intergalactic glory!



"I want to go back to Ampit VI. There, I'm an intergalactic hero. But here, I'm just another disgruntled mailman that's been abducted by aliens," reveals sentimental galaxy-brother Harris.



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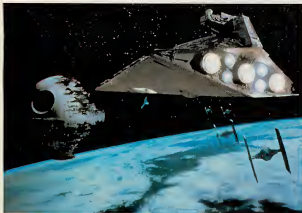


In a strange twist of fate, the mail Harris was supposed to deliver to **Steve Meszoly**—creator of "The Space Bar," "The Hitchhiker's Guide to the Galaxy" and numerous other science fiction games—ended up in the "hands" of a wide-eyed resident of planet Ampit VI.

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Listen to the Force

At the same time as George Lucas has been returning to his classic *Star Wars* trilogy to bring '80s technology to those '70s classics, LucasFilm, Ltd. has been putting together another unique twist on the excitement for fans of the Force. *Return of the Jedi Audio Play* (Highbridge Audio Co.) is a three hour dramatized retelling of the events of the third film, with a radio play written by the late Brian Daley. An impressive cast recreates the film's magic and provides a unique slant on a

Audio

story we've all grown to love. John Lithgow (pictured below) has added an additional sci-fi role to his star turn as the Supreme Commander from the hit TV show *Third Rock From the Sun* — he now provides the voice of the enigmatic Yoda. Brock Peters is featured as evil Lord Darth Vader, Ed Begley, Jr. becomes the bounty hunter Boba Fett, and Perry King swashbuckles as Han Solo. Repetition of his film role as C-3PO is Anthony Daniels. The presentation incorporates John Williams' original film score as performed by the London Symphony Orchestra, as well as the Academy Award-winning sound effects straight from the LucasFilm library. This long-anticipated release is available in bookstores nationwide in both compact disc and cassette tape formats or at 1-800-755-8532.



NEW ON VIDEO

Joe's Apartment: Jerry O'Connell, the star of *Sliders*, makes an unfortunate slide to the most terrifying dimension of them all — New York City! There he shares an apartment

with 50,000 surreal, singing, dancing cockroaches. Listen for the voice of the lead bug, who is played by Billy West of *Ren and Stimpy* fame.

Phenomenon: The title of this film doesn't refer to the phenomenon of John Travolta's resurgent career, but it might just as well, for the actor shines in this story of an ordinary man who develops extraordinary powers after being bowled over by a blinding flash of light from space.

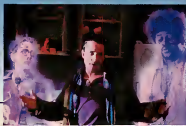
Fantastic Voyage: The 1956 thriller invites you to join a manamurized submarine and its team of scientists — plus a hidden saboteur as well — as they travel through an endangered scientist's bloodstream. With Rachel Welch, Edmond O'Brien and Donald Pleasance.

Plan 10 From Outer Space: Ed Wood continues to thrive in American cinema.

What does one do after failing to take over the world with *Plan 9*? Why, move onto *Plan 10*, of course! Karen Black appears in this low budget production that shows there still is a place for camp and tongue-in-cheek schlock.

Solo: Mario van Peebles stars as an indestructible android programmed to kill on orders from our government. But he becomes a Terminator with a conscience when he refuses to go on his murderous mission. Also featuring William Sadler and Barry Corbin.

The Frigtheners: Michael J. Fox made sci-fi movie magic with director Bob Zemeckis in the three films of their *Back to the Future* series. Now the team has come together again as Zemeckis oversees New Zealand director Peter Jackson in this psychic farce of a ghost buster who allies himself with the ghosts.



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George Lucas provides a New and Improved Hope as the *Star Wars* enters the Digital Age.



ABOVE: The defense of the Death Star continues in this composite shot from *Return of the Jedi*. BELOW: Darth Vader is made even more evil by the 20th anniversary *Special Edition*.

ABOUT-SO LONG TIME AGO IN A galaxy very, very close by, George Lucas created a movie that became a box-office sensation, revolutionized the way science fiction movies were made, and spawned a phenomenal merchandising empire. In 1977, *Star Wars* (retroactively titled *Star Wars: A New Hope* when it was decided that the first movie would be chapter four in a nine-part series) laid the groundwork for numerous innovations in movie special effects; indeed, Lucas' in-house effects company, Industrial Light & Magic, has been at the forefront of moviemaking technology ever since.

Now, to celebrate the 20-year anniversary of *Star Wars*, Lucasfilm Ltd. has closed the circle by bringing the full force of current special effects technology to bear on the original *Star Wars* trilogy. *A New Hope*, *The Empire Strikes Back* and *Return of the Jedi* have all been enhanced with new prints, digitally remastered THX soundtracks and a host of image enhancements made possible by recent advances in computer graphics technology. There's even new footage, including a meeting between Han Solo (Harrison Ford) and a CGI Jabba the Hutt in *A New Hope* and a musical number added to *Return of the Jedi*. How did this all come about?

Lucas had long wanted to upgrade the first movie, which he felt was limited due to budgetary constraints, special effects difficulties and deadline pressure while filming in Tunisia and EMI-Elstree Studios in England. The immense success of *A New Hope* made it possible for the two sequels to feature more sets, creatures and ships, as well as increasingly elaborate special effects sequences.

In 1995, Lucasfilm announced that plans were underway to film the second trilogy in the saga, a prequel which would take place forty years prior to the events depicted in the original trilogy. It was decided that prior to the release of the second trilogy, all three original movies would be given a digital makeover and rereleased theatrically to celebrate the twentieth anniversary of the series. 150 people at ILM worked on the \$10 million special edition of the original trilogy. In an interview in *Industrial Light & Magic: Into the Digital Realm*, TyRuben Ellingson, *A New Hope* visual effects art director (with Mark Moore) says, "It's like a virtual director's cut. Dennis Muren told me that George really wanted this to be the archival version, the one that went down in history."

Another goal of the special edition project was to provide ILM with a chance to get used to incorporating the new technology into the *Star Wars* milieu prior to the filming of the new trilogy.

Difficulties arose with the project when it was discovered that the original *Star Wars* negative had seriously deteriorated, despite extraordinary measures taken to preserve its quality.

What had started as a special edition project had now also become a restoration of the original film itself. After a year of painstaking restoration, a new negative was ready, and work on the special edition began in earnest.

None of the major changes in the special edition would have been possible without the extraordinary advances in special effects technology in recent years (see sidebar). Over the course of just a few decades,





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digital special effects grew from a novel form of animation to a sophisticated, widely-used technology that has changed the way movies are made. Computer Graphic Imaging (CGI) has brought dinosaurs and dragons to vibrant life and made it possible for Tom Hanks to shake hands with John Fitzgerald Kennedy. The technological advances came, but not without obstacles. After ILM successes with the CGI sequences in *The Abyss* and *Terminator 2*, Dennis Muren took a year off to study the technology and get ILM staffers up to speed on it. Part of the problem was creating computer software that was artist-friendly, so that people who had worked in the hands-on world of special effects could sit



ABOVE: Tutuoixe has been made busier thanks to advancements in special effects techniques. LEFT: Additional ships have been added to the earlier Star Wars installments.



down at a terminal and quickly learn to replicate those effects on a computer instead of in an animation studio.

Phil Tippett, former ILM stop-and-go motion animator, was a prime example of this transition. For *Jurassic Park*, Steven Spielberg had originally intended to use a combination of stop motion and full-size animatronic dinosaurs, and Phil Tippett Studios created stop

motion tests of key sequences. At the same time, CG animators created a number of test sequences of Gallinimus and T-rex skeletons (and later, the dinosaurs themselves). When the CGI sequences convinced Spielberg to switch from stop motion to computer animation, Tippett adapted by helping create a device called the Dinosaur Input Device (now called the Digital Input Device, or DID). The DID was

Science Meets Fiction: How Digital Technology Evolved

Star Wars: *A New Hope* began the creative process that eventually led to the explosion of digital effects in Hollywood. Here's a short tour of some of the movie milestones which led to the special edition of the *Star Wars* trilogy.

Star Wars (1977) introduced the motion control photography, in which computer-controlled cameras and models could be precisely manipulated for successive takes. Industrial Light & Magic founded.

Dragonslayer (1981) introduced go-motion photography, which applied motion control to stop-motion puppet animation.

Star Trek II: The Wrath of Khan (1982) featured the first-ever fully digital animation sequence with the terraforming of a small moon by the Genesis device.

Tron (1985) featured a number of computer-manipulated sequences and objects, including lightcycles, and cyberships.

Young Sherlock Holmes (1985) debuted the first CGI film character in the form of a knight made of panes from a stained glass window.

Tin Toy (1988), one of Pixar's high quality short films with 3D characters and sets generated entirely by computer animation, paved the way for *Toy Story*.

Willow (1988) featured the first use of digital morphing during the transformation of a sorcerer from animal to human form.

The Abyss (1989) refined CGI creature animation with its remarkable water pseudopods.

Terminator 2: Judgment Day (1991)

created incredible morphing and "liquid metal" effects for the sinister T-1000 terminator. Also featured digital removal of wires and stunt rigs.

Death Becomes Her (1992) featured the first CG replication of human skin for Meryl Streep's character. CGI was now becoming increasingly common in films and commercials.

The Young Indiana Jones Chronicles (1992) marked advances in digital effects, including digitally created backgrounds and extras.

Jurassic Park (1993) featured digital compositing and breathtaking, photorealistic CG dinosaurs, effectively supplanting stop-and-go motion photography. Also included mundane CG objects like the jeep attacked by the T-rex. These would become known as "invisible effects."

Terminator 2's morphing marvels led the way to the Star Wars Special Edition.



Forrest Gump (1994) was a showcase for seamless digital compositing, putting Tom Hanks into footage recorded years earlier. Also featured invisible effects such as digital replication of crowds and the digital removal of Gary Sinise's legs for the role of a double amputee.

The Mask (1994) featured extensive combinations of live action and cartoon-inspired CG animation.

Casper (1995) combined CG performers (Casper and the Ghostly Trio) with live action characters.

Jumanji (1995) featured CG animal stampedes, and broke new ground with the realistic animation of hair and fur.

Toy Story (1995) is the first feature-length film created entirely with CG animated characters and environments.

Dragonheart (1996) featured a photorealistic CG dragon designed to perform, speak dialogue and interact with live action characters. With its realistic skin, wings and facial features, the dragon was the most technically complex CG creature ever done, even surpassing the dinosaurs in *Jurassic Park*. Digital effects business is roughly doubling each year, with companies like Digital Domain and Sony's digital division competing with Industrial Light & Magic.

Star Wars Special Edition (1997) features digital compositing, backgrounds, enhanced visual and sound effects, and new CG creatures, including a mobile Jabba the Hutt inserted into a once-seen *New Hope* sequence with Harrison Ford.

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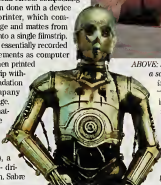
a stop motion armature loaded with sensors that record movements in 3D, allowing animators to translate motion data directly from a poseable armature into a computer. Phil Tippett Studios also made the transition from stop motion animation to computer animation, replacing animation stands with computer work stations (their work will be seen in the upcoming *Starship Troopers*).

As software advances bridged the gap between computer technicians and special effects artists, another innovative development came in the form of digital compositing and editing. Special effects compositing had previously been done with a device called an optical printer, which combined effects footage and mattes from several filmstrips onto a single filmstrip. Digital compositing essentially recorded multiple effects elements as computer data, which were then printed onto a single filmstrip without the image degradation that could accompany optical printer footage.

All of this culminated in the Sabre System (not an acronym, but a reference to a Jedi's light-saber), a user friendly, icon-driven software system. Sabre



ABOVE: Special effects wizard Phil Tippett animates an Imperial Walker for a scene showing the attack of the rebel stronghold on the ice world Hoth in *The Empire Strikes Back*. LEFT: Anthony Daniels as C3PO.



is faster and more interactive than other digital compositing packages, and it can also be combined with off-the-shelf or custom-written software, giving it greater flexibility. Sabre

was used extensively to create the special effects in *Forrest Gump*, and was instrumental in meeting the challenges of creating the special edition of *Star Wars*.

Lucas' initial concerns were with the scenes on Tatooine, particularly the desert starport of Mos Eisley and the scene where Jabba confronts Han. This had already been filmed back in the '70s with Harrison Ford

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PLANET OF THE APES

When I first saw this film I was a child and was taken with the fantastically real looking, and talking apes. Watching this as an adult, it becomes brilliant social commentary on animal ethics, evolution, nuclear war, the meaning of soul and a look into what it means to be human. Charlton Heston stars. #6109 (112 minutes) \$19.98



BENEATH THE PLANET OF THE APES

Astronaut Brent (James Franciose) crashed through the same barrier in search of the vanished Taylor (Charlton Heston). He arrives on a future Earth ruled by talking apes, and the last intelligent humans dwell in a subterranean city where they worship the one remaining nuclear weapon as their god. #6110 (100 minutes) \$19.98



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"We're always looking for new poetic talent," said Mr. Ely. "I hope you urge your readers to enter the contest. There is absolutely no obligation whatsoever, and they could be our next big winner."

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and another actor playing the role of Jabba, after the special effects crew was unable to come up with a convincing slug-creature for the scene. Unhappy with the existing footage, Lucas cut the scene from the film. Now, a CGI version of a younger, more mobile Jabba has been created and inserted digitally into the old footage with Harrison Ford.

New scenes were shot of Imperial Stormtroopers combing the desert for R2D2 and C3PO, this time featuring CGI dewbacks, lumbering reptilian beasts of burden (to replace a brief glimpse of a static, malfunctioning dewback prop from the original film), as well as small Imperial landing craft buzzing over the dunes.

Mos Eisley, that wretched hive of scum and villainy, was given a big facelift: what Lucas had originally shot with matte paintings, a few buildings and even fewer extras has now become a sprawling, densely populated metropolis with more people, places and things (the latter of which includes large, dinosaur-like rontos, beasts of burden upon which the Jawas ride, created by cannibalizing some CGI dinosaur models from *Jurassic Park*).

One scene was apparently changed because of its political incorrectness. In the original confrontation between Han Solo and the bounty Hunter Greedo, Han fired first, killing Greedo (though it was clear that he had little alternative). Lucas, who didn't want his roguish space pilot looking like a cold-blooded killer, altered the scene so that Greedo now fires first, barely missing Han before he's gunned down.

Other changes to *A New Hope* include a new panoramic shot of the rebel fighters flying past the planet Yavin on their way to attack the Death Star. This was originally created in two shots due to limitations in the motion control cameras. Now digital X-wings and Y-wings have replaced the motion control models and the scene is now one continuous shot, with a 180 degree pan from Yavin's moon to the view of the Death Star. Shots which consisted of multiple filmed elements optically printed onto one film strip (with a successive degradation of image quality) now feature computer-generated images with no loss of overall image quality. Explosions, mattes, shadows and other effects have been digitally tweaked, as well.

Changes to *The Empire Strikes Back* include new footage of the Wampa snow creature that drags Luke to its lair. More shots of the creature in its cave will be shown to heighten the suspense before Luke's escape. Additional footage of the cloud city landing sequence was produced, with the *Millennium Falcon* maneuvering through the spires and buildings of the orbiting station.

The musical number in *Return of the Jedi*, featuring a number of creatures in Jabba's palace, was planned when the film was originally shot, but Lucas was dissatisfied with the mobility and articulation of the creatures, so the scene was shortened. Now it has been

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ABOVE: The Death Star trench battle sequence required scanning and recomposition.
BELOW: Luke rescues Leia from Jabba's sail barge in Return of the Jedi.

expanded again.

Many fans have already seen a number of these sequen-ces. At press time, the film trailer (which was previewed at last year's Worldcon) is in distribution, and some scenes were revealed in the IMAX film *Special Effects*. An all-new version of the opening sequence of *A New Hope* was shot especially for IMAX, but will not be seen in the special edition.

What impact with the special edition of the trilogy have? Certainly some fans and critics are justified in saying, "if it ain't broke, don't fix it." *A New Hope* remains an exciting and beautiful film even with its imperfections — its incredible success is testament to that. Does it really need to be brought up to speed with its sequels? The motivation behind this special edition begs the following question: will Lucas feel compelled to technologically upgrade all the *Star Wars* movies again in another ten or twenty years?

Another concern is one of density. Each of the sequels featured more vehicles, more

creatures, more ships, and so on, until *Returns of the Jedi* was bursting with visual elements, almost to the point of overkill. While it will be intriguing to see more of this visual density in *A New Hope*, will Lucas feel the need to keep adding more stuff to the sequels as well? What impact will all this new footage and visual tinkering have on the pacing of the saga? Will it affect the story of *Star Wars*? Couldn't all this time, energy and money have been poured into getting the first installment of the new trilogy out that much sooner?

I freely admit that I'm pretty skeptical of special editions and director's cuts. All too often they're more about money than they are about artistic revision. In a recent press release from 20th Century Fox, an executive gushed that the *Star Wars* special edition is "a marketing and distribution dream" — you could just about hear the fluttering of dollar bills in his mind. There's little doubt that the revamped *Star Wars* trilogy is going to dominate the box office, at least initially. A merchandising blitz will certainly follow.

Special editions sometimes backfire, too — consider the lukewarm critical and public response to Steven Spielberg's ham-handed revision of *Close Encounters of the Third Kind*. On the other hand, they sometimes work well. James Cameron's director's cut versions of *The Abyss*, *Aliens* and *Terminator 2* have all been improvements to some degree.

The bottom line is that it's pretty clear that the special edition of the *Star Wars* trilogy will supplant the existing version that's available now. If you want to preserve the trilogy as you know it, now, you might consider investing in the letterboxed versions still available on laserdisk and video — they won't last long after the special edition of *A New Hope* premieres in late January. With any luck, the Force will have been with Lucas and ILM, and the special editions really will be something special. □



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Discovering planets outside our solar system changes the way we look at the universe.



ABOVE: Bob Eagleton's "These" depicts a distant ice planet that has fallen into orbit around a star.

BELOW: An artist's conception of the ringed 47 Ursae Majoris and the larger 70 Virginis.

SINCE THE BEGINNING OF TIME, MANKIND HAS always hoped that there might be other planets out there sharing the vastness of space. Suddenly, recent discoveries have made us successful in our search. How have we gotten here? And most importantly, where do we go from here?

Yoji Kondo, an astrophysicist, has been director of the geosynchronous satellite observatory IUE. Two years ago, he co-organized and co-chaired the International Astronomical Union Symposium in the Hague on "Examining the Big Bang." As Eric Kotani, he has written five SF books, four with John Maddox Roberts and one with Roger MacBride Allen. He is now finishing a novel *The Death of a Neutron Star* for Pocket Books.

Charles Sheffield is the chief scientist of Earth Satellite Corporation, and since 1968 his principal career activity has been in the development and use of spaceborn and earth-based imaging systems. He is the author of best-selling

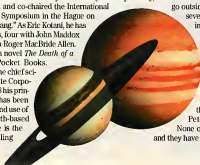
books of both science fact and science fiction. His most recent novels are *Tomorrow and Tomorrow* and *The Billion Dollar Boy*.

SHEFFIELD: Let us put this into an historical context. If you were Giordano Bruno, in 1600 you'd be burned at the stake for suggesting that there were other worlds, an infinity of worlds. People had the idea that the number of planets in our own solar system was fixed, until the discovery of Uranus in 1781 by Herschel. The philosopher Hegel claimed he had proved, from general philosophical arguments, that there could only be seven planets in the solar system. With the discovery of Uranus, the system was therefore complete. His philosophical theories were destroyed by the discovery of the minor planet, Ceres, in 1800. Philosophers do not necessarily make the best astronomers. Many more planetoids were found after 1800. And then came Neptune in 1846, and Pluto in 1930. That's our current solar system, as it is today. For a long time there has been speculation that there might be planets around other stars. We have to ask, why isn't it possible simply to look at other stars and see planets going around them? There are two different reasons. One is our atmosphere. When you look at the wonderful pictures from the Hubble telescope, you may wonder why we can't get equally good pictures from the surface of the Earth, because the Hubble is not the biggest telescope there is. Its mirror is 2.4 meters, less than half of Mount Palomar. But when you look through the atmosphere, it degrades fine details of all kinds. That's the first obstacle to seeing planets around other stars — we have been looking up through our atmosphere. The second problem is that the planet itself shines very weakly compared with the star. It has a very, very tiny light signal coming to us. So we have two different types of problems. One is the amount of light available, and the other is the fact that if you're looking from the Earth, you're always looking out through this soupy atmosphere, and the small-scale turbulence of that will prevent you seeing in enough detail.

KONDO: That is essentially correct, except that the new adaptive optics technology, which can correct for atmospheric disturbances. For direct planetary detection, probably, as Charles has been suggesting, we still need to

go outside Earth's atmosphere. There are several methods for detecting a planet in addition to direct viewing of the planet. The first method used was the astrometric methods; we use the fact that the existence of a planet sized body would cause motions in the primary star in the plane of the sky. Such a discovery has been reported several times through the '60s and the '70s particularly by Peter van de Kamp, a Dutchman.

None of those reports were confirmed, and they have been dismissed as false alarms.



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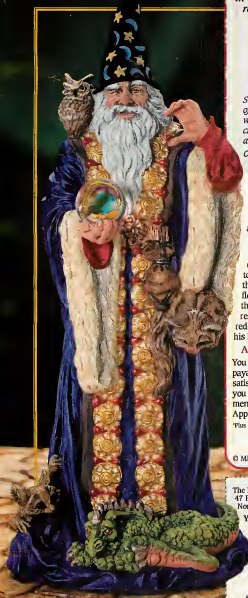
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ABOVE: The planet known as 52 Pegasi can for now only be deduced but not truly seen.

SHEFFIELD: Perhaps we should point out that these irregularities we're talking about in the motion arise simply because the star and the planet move around their common center of gravity. Although you think of a planet going around a star, in a sense the star also goes around the planet. What you detect is the tiny wobble in the position of the star. You never see the planet. The discovery of a companion of Sirius, by Bessel, in 1844, was done by looking at the movements of Sirius itself. Its position varied in the sky as the two stars went around each other. Alvin Clark, an American astronomer, first saw the companion of Sirius in 1862. It's a more difficult job for a planet, because the planet will normally be much less massive than the star. The movement of the star around the common center of gravity will be very, very small. The planet may be making a large excursion, as big as the orbit of Jupiter, but the star itself will move a very small amount in the sky.

KONDO: Let me quickly add that, even in the early days of the SETI program (Search for Extra-Terrestrial Intelligence), one of the primary methods considered was still the astrometric technique. The other options, in addition to the direct imaging, included the

spectroscopic method. If a planet were revolving around the primary star, with its orbit more or less in the line of sight, that could cause motions in the primary star, although the planet may not be seen. Now we are talking about very, very fine variations which are difficult to detect, remembering that the mass of the sun is something like three hundred thousand times that of the Earth. The motion of the Earth at this distance from the Sun is about thirty kilometers per second. So one-three-hundred-thousandth of that would come to something like nine centimeters per second. And even if some planet like Jupiter were at Earth's distance, it would cause only a thirty meters per second motion in its sun. It's a very difficult detection. But the state of the art of our technology has improved to the point where we can talk about doing this. The other method is photometric detection, in which the eclipse of the primary star, caused by a companion planet, might be detectable. This too is an extremely difficult task to accomplish because any such eclipse would involve a very small quantity of light subtracted from the light of the star. For instance, Jupiter's radius is about a tenth the size of the sun, but

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PLANETS OF OTHER STARS

Star	Distance of planet from star (Earth to sun = 1)	Minimum Mass (Jupiter = 1)	Orbit Period (days)
52 Pegasi	0.05	0.5	4.3
17 Ursae Majoris	2.1	2.4	1,103.7
70 Virginis	variable	6.6	117.00
55 Cancri	0.11	0.8	14.76
HD 114762	variable	0.0	84.00
Tau Bootis	0.0047	3.7	3.30
Upsilon Andromedae	0.054	0.6	4.61
Lalande 21185	2.2	0.9	5.8

area-wise, it's only one percent. And it's very difficult to detect a variation of one percent for sure. Lots of stars are variable stars. They have variations. Also, if you observe from the ground, atmospheric extinctions and other effects tend to make the detection of such variations very uncertain.

SHEFFIELD: Historically the most famous variable star, Algol, is an eclipsing binary, in which one star is passing in front of the other. That's possible when you have objects of comparable size to each other. As Yoji said, when you have something that only obscures one percent of the star, you're looking for such a small variation in the light curve that you have very little confidence in the result. Every one of the techniques we've mentioned are close to the limit of what you might hope to do. We're down at the limit of observational accuracy. Some people have said to me that because the extra-solar planets that we seem to be discovering nowadays are all the size of Jupiter or bigger, that all the planets around other stars are big planets, and not ones we can live on. But that's not true at all. The reason the ones we have observed have been the size of Jupiter or larger is that those are the only ones we can observe. A small planet will perturb the star so little, or will obscure so little of the star, that we don't observe it. The fact that everything we have discovered evidence of so far is Jupiter's size and bigger tells us nothing about the distribution of small planets. If the planet is small, we just don't find evidence of it. For all we know, most other systems are just like ours, in terms of the distribution of planet sizes. But we obtain evidence only of the most massive planet in the system.

KONDO: And that itself is very valuable. Because once we know that more massive planets exist, at least based on our current understandings of how the planetary systems are formed, then we have also a good chance of finding smaller planets in solar systems where we find larger planets. It is not guaranteed. But it is plausible that find smaller planets there.

SHEFFIELD: Yoji already mentioned SETI. One of the elements used in SETI is the Drake equation. The Drake equation is a product of seven different factors, none of which we know much about. One of the factors is the number of planets around another star. As long as you have no information about that, the Drake equation is very weak. We're now getting a hold, at last, on the question as to how many planets are likely to be around other stars. That is very encouraging. After finding nothing, suddenly, in the last year, ten or more planets have been seen: or rather, not seen, but their presence has been inferred from their light curves and from their movements.

SF AGE: So what has been the history of the discovery of extra-solar system planets?

SHEFFIELD: It was nothing until a couple of years ago, although there was the discovery of what was felt to be a proto-planet disc

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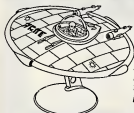
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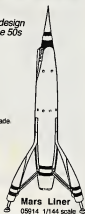


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around Beta Pictoris—a disc of matter which could lead to the creation of planets. Then in the last eighteen months we have found a number of actual extra-solar planets. (See boxed list.) You might say, why suddenly are we able to do this? I think the answer is first, the interest level has increased enormously. A handful of people were doing this work, using spectral and astrometric work to see if they could see planets; but when someone came up with actual evidence in Italy, and this was confirmed independently by another group in California, more people felt this was a fruitful field to work in. That's why you're seeing so many new discoveries. I suspect that we will see reports every month or two of a new extra-solar planet. But they are big ones. If you look at the masses of the table, you will see that they tend to be half of Jupiter mass or more. There's another interesting thing about some of these orbits. Conventional theory for the formation of planets says that you should not have a Jupiter-sized planet close in to the star. For instance, we wouldn't expect something the size of Jupiter to be where Venus or Earth is in our solar system. In these other systems, they're finding Jupiter-sized planets very, very close in to the primaries. Maybe only 20 million kilometers away, whereas we are 150 million kilometers away from the sun. It means that there is a Jupiter-sized planet in almost a grazing orbit around the star. Nobody knows what that says about the stability of other planets, whether they could exist in the zone in which our planet exists. Would a Jupiter-sized world have swept the space clear, preventing the formation of a planet? People now believe there is no planet between Mars and Jupiter, because Jupiter's gravitational influence prevented a planet from ever forming. If that's true of other stars, we have to revise our ideas on the way in which planets form. Second, it's bad news if we want planets at the right distance for the support of life as we know life.

KONDO: The first report was very interesting, but it did not really convince everybody that it was a planet-sized body. The possibility existed that perhaps it was a brown dwarf, a very small star that is too large to be a planet. If that small star were orbiting around the primary away from the line of sight, its influence on the primary star expressed in the form of line of sight motions would be small. So really we do not know from that first report alone that it is a planet. But with all those ten or so detection reports, it's more and more likely that there are Jupiter-sized planets somewhere. Some of these may be brown dwarfs, but statistically speaking, it's more and more likely that at least one of them is indeed there.

SHEFFIELD: My bet is that we will see more and more of these discoveries. There are two reasons for that. One is that electronic equipment for light measurement has become superb. During the last twenty-five years, there has been an order of magnitude

Continued on page 99

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JUST A COUPLE OF HIGHLY EXPERIMENTAL WEAPONS TUCKED AWAY BEHIND THE TOILET PAPER

BY ADAM-TROY CASTRO

Illustration by Joel Naprstek

Vossoff and Nimnitz were the most inept space criminals the universe had ever known. Then they found out there was another universe next door.

RECOVERING FROM SEVERE MENTAL trauma in an advanced interstellar civilization can be more difficult than it sounds... especially when the other patients on your ward include carnivorous lizard-things with transparent skulls, shuffling blobs of semi-liquid goo who shoot acid at three-second intervals, and soulful-eyed marsupials who carry their own digestive organs around with them in buckets.

The problem is not simply that some of these creatures are alien enough to shatter your already delicate psyche, it's that you cannot regain your grip on reality at all without first figuring out which of them are really there and which are just your playful subconsciouses having fun with you. You can waste years in such an institution, gradually learning to accept that the giant slug which keeps trying to eat you during group therapy is just a delusional manifestation of your deep-rooted childhood resentment toward your sweet little silver-haired mother, only to find out after multiple shock treatments that you are in fact a giant slug yourself, and that you never had a sweet little silver-haired mother except as an appetizer.

Under the circumstances, it's easy to see why folks who go insane in advanced interstellar civilizations usually remain that way.

In the case of that notorious interstellar criminal Ernst Vossoff, who had spent the better part of the past three years in the incurable ward obsessively cutting out paper dolls, giving them names, and using them to reenact the Napoleonic Wars in brutally realistic campaigns that left the floor of his padded cell ankle-deep in confetti, he remained a conscientious objector to reality until the day his principal therapist oozed in through the heating vent and spoke kindly supportive words through the prosthetic Sigmund Freud head it held between its multiple rows of razor-sharp teeth. "Ernst, my boy! How are we doing today?"

"Am I Abraham Lincoln?" drooled Vossoff. "I think I'm Abraham Lincoln. I used to be Genghis Khan, but then John Wayne got the part. Why can't gravity be less of a law and more of a gentle suggestion? Kenneth, what is the frequency? Goo goo ga joob."

"Excellent," said the therapist, who naturally



came from an alien culture where pointless non-sequiturs were considered the soul of wit; he'd spent years training Vossoff to make absolutely no sense whatsoever, and he personally thought that the Earthman had made almost enough progress to be released into the community. "I've been directed to tell you that you have a visitor."

"Salvador Dali once dated a moon goddess. There are fourteen Is in the word kangaroo. Why isn't republicanism an adverb? Bloncsptoch McGillicuddy, I've got a bunton."

The therapist beamed (literally, since his race emitted laser fire when happy). "Absolutely. I'll let him in."

And so he oozed out of the way as the door irised open to admit a singularly unusual specimen of terran-strain humanity. aforementioned specimen being a burly, hairless, moist-eyed thug whose expression was not inordinately far from the perpetual incomprehension native to the faces of toy poodles.

All of Vossoff's painstakingly installed nonsense conditioning melted away in a single instant. He shrieked, "YOU!!!!", burst his straw-jacket, and leaped across the cell, his hands already spasmodically twitching in anticipation of their fatal grip on the neck of his traitorous ex-partner Karl Nimmitz. But even as the murderous Slav made contact, Nimmitz pressed the larger of two buttons on a small device in his right hand, and both men vanished ... so perplexing the squidlike therapist that he actually swallowed his prosthetic Sigmund Freud head in a single gulp.

The therapist was, by the way, later proven to be one of Vossoff's delusions. But that was okay. His success rate with the other patients was so high that he was still permitted to practice medicine.

AS FOR VOSSOFF, HE WAS NOT QUITE IN the mood to interpret this as a rescue. He stood on the gleaming control decks of Nimmitz's brand-new top of the line space cruiser, immobilized by an automatic ship's security stasis field, threatening bloody revenge at the imbecilic ex-partner snailing at him from the opposite side of the control room.

"I will murder you," Vossoff ranted. "I will expunge you from existence. I will render this universe a place where you never lived. I will travel back in time and unplug the refrigeration unit on the fetus vending machine that spawned you. I will travel back still further, seek out the mother of the demented genius who invented the technology, and persuade her to forego parenting in favor of a career dancing in alien ballets. I will travel back still further than that, and force-feed her great-great-grandparents mind-altering drugs so they think they're different species and thus never fall in love or mate, and from there I will travel to the very earliest beginnings of evolution on your wretched homeworld, and stomp down hard on the first trilobite I see crawling from the primordial muck!"

"Gee," Nimmitz said, with his characteristic lack of irony. "I thought you'd be happier to see me."

"You paleolithic putz! You married my hated ex-wife, let her steal the fruits of my genius, and raised not one peep of objection as she transformed me into a mound of fat the size of a mountain range!"

Nimmitz blinked so many times in the next second that his eyelids almost opened a gateway to another space-time continuum. "Gosh. I guess I do owe you an apology for that one. I mean, I did marry Dejah, and we're very happy together, but I honestly didn't know about that mound of fat part. Although, come to think of it, it does sound like the kind of thing she would do. How on Vilhan did you get changed back to normal?"

"It didn't happen on Vilhan, you backstabbing bastion! And never mind how I managed it! It's enough that I spent the last three years recovering from the psychic trauma! And when I get my hands on you and that traitorous little trollp, I'll—"

A multitude of voices behind Vossoff interjected in unison. "... be rich beyond your wildest dreams of avarice."

Vossoff whirled, expecting a mob, finding instead a single alien creature of a species he had never personally encountered before: one that could have been described as an old-fashioned coffee table bearing dozens of tiny, grinning, multi-fanged fish heads in upside-down bell jars. It took him a second to see that the table was in fact wholly organic, that the heads were all attached to it, and that the legs were sinuous prehensile tails lined with moist wriggling cilia. The upside-down bell jars were evidently some sort of breathing mechanism, providing the beast with its version of a planetary atmosphere, which suited Vossoff just fine, as he was instantly grateful to not be sharing his own precious oxygen with such a thing.

Still, Ernst Vossoff being who and what he was, it took him only half a heartbeat to cut past the strangeness of the alien's appearance, to the heart and soul of what it had said. And then he grinned, and twirled the tips of his walrus moustache, and spoke with sudden deceptive calm. "Ohhh, I wouldn't know about that. My wildest dreams of avarice are rather unrealistically grandiose."

"So we've been told," said the collection of heads. "Indeed, all of our exhaustive research into your background confirms you to be an awfully single-minded specimen of the peculiar human subgenre known as 'greedy bastards'. Nevertheless, we feel perfectly justified in asserting that even you cannot possibly underestimate the extent of the riches we offer you."

"Really? Not even if I want, say," Vossoff made a big show of trying to come up with just one random idea off the top of his head, "a mercenary army powerful enough to crush all opposition, raze everything in its path, conquer the galaxy and install me as official emperor and god?"

The collection of heads wagged its cilia disparagingly. "Pfah! Pocket change! We thought you had more ambition than that!"

Vossoff tapped his lips with the tip of his index finger. "Interesting," he said finally, in the kind of disparaging tone designed to show how little he meant it. "And would I have to share these ill-gotten gains with my mindless ceph of an ex-partner, who so ungratefully left me suffocating beneath billions of tons of quivering cellulite?"

Nimmitz cried out: "HEY!"

"The answer to your question," said the collection of heads, "is no. The wealth and power would all be yours. All Mr. Nimmitz wants out of this deal is to get his beloved wife back. In short, Dejah Shapiro is missing, and we feel that you are the only man in her life even remotely sentient enough to find her."

Once again, Nimmitz cried: "HEY!"

Vossoff grinned. "So. Let me see if I have this straight. If I agree, I get to rule the galaxy like a god. If I refuse, my ex-wife remains missing and is never heard from again. Is that, minor explanatory details notwithstanding, essentially the difficult choice you are offering me?"

"Essentially," said the collection of heads, "yes. Except that it wouldn't be this galaxy, but another one identical to it in every way."

Vossoff chewed on that. Chewed on it some more. Tapped his foot while continuing to think about it further. Almost opened his mouth to speak, then stopped and simply paced back and forth. He was imitating a set of scales with his outstretched palms, raising first one, then the other, but seemingly either unwilling or unable to make them balance out to anything other than perfect equilibrium, when an anguished Nimmitz cried out: "Oh, come ON, Ernst! That isn't fair!"

IT WAS TWENTY MINUTES LATER. VOSSOFF HAD WASHED UP; SHAVED, and dressed in a fresh jumpsuit befitting the criminal mastermind that he was. He and Nimmitz now sat side-by-side in the control room, listening to the alien's spiel.

The collection of heads turned out to be a renowned physicist from a major university on a planet that translated as [the sound of water being absorbed by desert sand]. His own name translated as [the sound of water being violently expelled by desert sand], which on its planet is a silicon-based intelligence that cannot abide the taste. Inevitably, he used to be teased about the name as a crecheling, was inevitably saddled with the insulting nickname [Mad-epist], and had to suffer through such traumas as the time in the neighborhood vomitorium when—

"Get on with it," growled Vossoff.

[Mud]'s cilia trembled in brokenhearted annoyance. "I am beginning to realize why so many of your people consider you a real jerk, but very well. — We (that is to say, not just the group-entity standing before you, but an assortment of other qualified group-entities much like us who functioned as our peers in this project), have recently invented a cure for unhappiness."

Vossoff leaned back in his chair and rested his chin on his own interlocked fingers. "So have I. It's called obscenely vast quantities of wealth and power."

"Frankly, we believe so, too, but merely recognizing that won't persuade other sentiments to freely provide us with either. Therefore, we have designed an entirely new technology which we believe will swell our coffers considerably. It's called the Alternatrix, and it's essentially a doorway into alternate universes ..."

"Oh, puh-lease!" Vossoff derided, with a dismissive wave of his hand. "Don't tell me that's your big mysterious scheme! Interdimensional travel has been old hat for years!"

"We are aware of that, Mr. Vossoff, just as we are aware that it's never been rendered practical. The time and energy involved in sifting through the literally infinite number of alternate universes has long been the major stumbling block preventing anybody from finding those that substantially improve on this one. After all, alternate universes are not labeled, or for that matter, arranged in any coherent order — one can waste entire eons struggling to identify the unique quality of a universe that differs from ours only in the precise position of an individual thumbtack on a departmental bulletin board in the regional tax offices of an obscure planet otherwise known only for the rubbery taste of its pasta. And indeed, I did not come up with that particular example just out of thin air, since before we came up with our breakthrough, our project founder, the venerable Professor [found of granite hillside ending into shape of terrestrial carrot], did drop dead of shock when, after cataloguing over 200,000 separate universes where the thumbtacks on said bulletin board varied no more than a couple of centimeters in one direction or another, he finally located a plane where the office staff had used staples instead."

"Staples?" cried Nimnitz. "The flenda?"
[Mud] froze in mid-expression, staring at the horrified Nimnitz, unable to parse the precise relevance of his interruption. After a moment, he shuddered with several dozen heads at once, and continued: "It's clear that most alternate universes are not even worth the time and effort of exploration; they're like theme parks to irrelevant diversity. The problem has long been the difficulty in developing an intelligent filtering mechanism, capable of taking your specifications for the precise kind of alternate universe you wish to find, and then instantaneously scanning the myriad dimensions for the one that fits your description. This, sir, is our Alternatrix."

Vossoff brushed his moustache. "So, if I asked you — purely as an illustration, mind you — to find me a universe where science fiction editors mate with vending machines, dentists are required by law to daily beat their thumbs with hammers, and a secret conspiracy of professional wrestlers was responsible for the assassination of the twentieth-century American president John F. Kennedy ..."

"I would ask you whether you meant masked or unmasked wrestlers."

"And if I replied, 'masked'?"
"I would ask Olympic, Mexican, or World Federation. Trust me, sir ... you cannot name an alternate universe so ridiculous that our Alternatrix is not capable of finding it. Which is how we can promise you a galactic empire: we know we can find a universe willing to accept you as ruler."

Vossoff thought about that, smiled, and cracked his knuckles. "And just how did you intend to use this as a cure for unhappiness?"

"The Alternatrix reads its subject's brain-waves and automatically opens a portal to the parallel universe most likely to strike any individual as paradise."

"And I suppose you will require people to sign over all their money and property before taking this one-way trip?"

[Mud] snorted. "Of course. We're not doing this because we're fuzzy-headed liberals. We have a profit motive here."

"And how can they know you're not simply transporting them into the center of a sun and pocketing the money? It's what I would do."

"Because we won't make them sign the papers until they've returned from a one month free trip to see whether it's really what they want. By then, they're desperate to sign. It's all very aboveboard, really. And a sure-fire moneymaker, since nobody's ever really been satisfied with the universe they were born in. We foresee a 50,000 percent profit within the first standard year of operation, but we don't actually have the funds to launch this exciting new enterprise on the interstellar scale it requires. Which is frankly why we met with your ex-wife, who as you know, happens to be one of the three wealthiest individual sentiments in the known universe ..."

"... and who is now missing," Vossoff concluded.
"Correct."



VOSSOFF TAPPED HIS CHIN THOUGHTFULLY.

"You need not continue. You have already given me enough information to reconstruct the events that led to the dear woman going AWOL. You offered her a taste of her ideal universe as a demonstration prior to investment."

"Correct."

"Nimnitz, here, interrupted just long enough to make an irrelevant, and no doubt mind-bogglingly stupid remark."

Nimnitz stired. "Hey."

[Mud]'s collected heads shuddered at the memory. "Indeed, the insane contents of his contribution still sends shock waves reverberating throughout our culture. We are hoping to spend much of our first year's profits on genomat treatments so we can evolve hands and slap our collective foreheads in astonishment."

Nimnitz said, "Hey."

"No doubt," Vossoff persisted, "whatever he said had something to do with pastrami."

"Please. Don't reconstruct it. It's already driven my podmates and eggings to mutual defecation."

Vossoff nodded sympathetically. "And you don't know how many years I actually LIVED with that. — Dejah used some pretext to trick you into leaving the room, quickly reprogrammed the Alternatrix, and immediately sent herself to some unknown alternate universe of her own choosing, scrambling the database so she could hide on that plane indefinitely without you or your people ever being able to find her, retrieve her, and finalize the agreement that would make the transfer of all her collected wealth legal and binding."

"All correct."

"You need me, as the only sentient man in her life ..."

Nimnitz rose up out of his chair. "HEY! HEY HEY HEY HEY!"

"... to figure out which, out of the literally infinite number of alternate universes she might have chosen for herself, is the one where she's hiding, so you can yank her out of there, threaten to bar her from that particular paradise should she not choose to ante up, get her signatures on your contracts, claim her entire fortune, and commence building your business empire."

Two dozen fish heads nodded vigorously enough to set their little bell jars chiming at high pitch. "An astounding set of deductions, sir."

"As a certain famous ancestor of mine once said," Vossoff replied, twirling his walrus moustache with self-congratulatory aplomb, "Elementary." He bowed. "May I respectfully ask that you permit my expert and I some time alone on this matter? I'm certain that as the two great loves of Dejah's life, we will be able to come up with some helpful epiphanies."

Dozens of alien lizard-heads regarded Nimnitz doubtfully. "Do you truly believe he'll be any help? On our way here, when we were cruising hyperspace at fifteen times the speed of light, he actually tried to step outside with a flashlight to see what would happen when he turned on the beam."

"Interesting. I honestly believed I'd long since talked him out of that experiment. Nevertheless, one of the wealthiest, most desirable, most

lusted-after women in the known universe has inexplicably given him her heart, so there must be a semblance of coherent electrical activity going on in that absurdly designed head of his. If nothing else, he will be invaluable in helping to isolate the wrong answers."

"Very well," [Mud] said doubtfully, as he scuttled away on his many elegantly varnished legs. Few creatures in the universe, with the possible exception of middle aged terran accountants in horizontally-striped bathing suits, would have looked more absurd leaving a room. Vosssoff watched him go with his gladhanding smile firmly in place — and a heretofore unseen resolve just beginning to well in his cruel Stalnesque face.

NIMMITZ WIPED A TEAR FROM THE corner of his moist puppylike eyes. "Do you really think you can find her, Ernst? I miss her an awful lot."

"I cannot make any promises, you humanoid gerbil. It has, after all, been several decades since she and I were pronounced man and harpy. I never truly understood her even then, and the special laws of thermodynamics that govern shrewish ex-wives provide any number of revolting ways that she might have

become even more incomprehensible in the interim. Indeed, she would have had to, to honestly prefer you over me."

Nimmitz said, "She used to laugh in bed about the way you —"

"Yes, yes, yes, I'm certain it was very cute and made me look woefully inadequate. But that is irrelevant now. What is relevant is that I fully understand why the dear woman seized the opportunity to hide. She clearly recognized our foes for what they are: one of the greatest threats ever to face the known universe."

Nimmitz giggled. "Huh?"

Vosssoff slapped his forehead. "She must have been happy with you for SOME reason ... tell me, how frequently do you two make love?"

"Monday through Friday."

"You make love five times a week?"

Nimmitz blinked. "No, just once. Monday through Friday."

Vosssoff weighed the image, shuddered meaningfully, then moved on. "In any event, as I started to say before your personal IQ famine forced that annoying detour, it's perfectly clear to me why Dejah went into hiding. She knew that if she didn't try out the Alternatrix, then [Mud] would find some way to force her, in the hopes that she'd emerge from her personal perfect paradise brainwashed and eager to sign over her entire fortune in exchange for passage back. She knew that her fortune would enable these ambulatory chippendales to establish their enterprise on a galactic scale, that few sentient creatures would be able to resist the siren call of paradise, and that entire star-spanning empires would happily hand over all their collective wealth just to buy their populations billions of individual one-way tickets to Never Never Land. The galaxy would be depopulated in a few short years, leaving it by default the sole property of [Mud] and his fellow knishknack tables."

Nimmitz scratched the top of his preternaturally smooth head. "Would that be a bad thing, though? Everybody would still get to live in paradise."

"A surprisingly good point, coming from a cretin who normally only has points at the top of his head. Were I of a certain philosophical bent, I would respond with a pretentious Shatnerian speech about life not having any meaning without first having to fight and suffer and endure great hardships for every fleeting scrap of happiness, blah blah blah, but frankly, Karl, that philosophy always seemed like a bunch of horseshit to me, as I'd frankly much prefer obscenely vast quantities of wealth and power and happiness all handed to me on a silver platter. No, personally, what keeps me, and I strongly suspect Dejah, from eagerly buying a one-way ticket through their device is the knowledge that the coffee tables haven't preceded us up that particular stairway to heaven."

As usual, Nimmitz was fourteen steps behind him. "Huh?"

"Think for once! They already have a working prototype; they can simply use it themselves instead of exploiting it commercially. Instead, they're staying right here, on this plane of existence, happily plotting a universal conquest that depends entirely upon the rest of galactic civilization rushing where they themselves refuse to tread. This, my planetary friend, is as conducive to trust as entering an allegedly gourmet restaurant and spotting the chef in the back, furiously scarfing a meal of greasy fast food from just up the block — i.e., if his own food is as incredibly wonderful as advertised, then why is he clogging his arteries with the ordinary slop the proletariat eats?"

"I know!" Nimmitz shouted, happy to contribute for once. "Because he likes to do the connect-the-dots puzzles on the place mats!"

Vosssoff froze in mid-dissertation, as usual thrown off course by his ex-partner's inimitable manner of cutting to the meat of a problem. He blinked several times in rapid succession, and then for several seconds emitted an excruciating grinding noise that might have been the sound of a recently derailed train of thought being forcibly returned to its previous set of tracks. "I infer from the generally humanoid design of the furnishings that this ship belongs to you?"

"Dejah. Her personal yacht. She doesn't let me drive."

"Smart woman. I also infer that our friend with the unpronounceable name doesn't let you drive either?"

"Oh, sure," said Nimmitz. "He brought along a platoon of heavily armed commandos from his homeworld, and they've switched all navigation and control functions to a secondary control room behind the Pachinko parlor. They did that just after they won the battle and seized the ship. Did I forget to tell you that?"

"That's all right," Vosssoff replied. "I'm sure that I would have figured out we were prisoners sometime after they resorted to questioning under torture. — Tell me, you monument to the gods of ineptitude, where does Dejah keep her weapons locker? Not, mind you, the big shiny one no doubt marked WEAPONS LOCKER that she filled with ominous-looking but nonfunctional phonies that hijackers like our friends the coffee tables are intended to find ... but the hidden cache of genuine top-of-the-line hardware that are honestly meant to be used?"

"In the bathroom. Behind the toilet paper dispenser. Dejah says she put it there so I'll think twice about leaving the seat up."

Vosssoff shook his head, overcome with fond memories of an argument that he and Dejah had once fought over that very controversy. It had raged for most of their honeymoon, and resulted in each of them eventually hiring mercenary soldiers to enforce their own point of view. The open warfare had destroyed ancient civilizations on fifty separate star systems. He shook his head, to clear away the happy reminiscences, and said: "Come on. We have some coffee tables to polish off."

THE FIRST LAW OF INTERNAL SECURITY ON A STARSHIP IS TO HAVE A reasonable sense of proportion vis-à-vis the need for superior firepower. For instance, it does you absolutely no good to fire an all-powerful Bethehline Munitions Destructo-Beam through the palpitating hearts of the slaving carnivorous mutant advancing down the corridor toward you, if said Destructo-Beam emerges undiminished from said mutant's back and proceeds to punch a tunnel the size of an orange through all twenty layers of your outer hull. Far from it, for even though you currently exceed the size and shape of an orange, explosive decompression will still succeed in improvising a way to fit you through that hole. No; if you must regularly fight pitched battles in the corridors of your starship, it is best to equip yourself with weaponry that can incapacitate your enemy without making an orange out of you.

With that in mind, Vosssoff and Nimmitz armed themselves and began their offensive.

They encountered their first alien coffee table in the corridor immediately outside the main control room. He was a tough customer, something Vosssoff recognized because all the heads in the little bell jars had eyepatches and dueling scars, and also because all four of the table legs were marked with animated holographic tattoos of alien supermodels doing obscene things to fluffy pink bunnies. When

Continued on page 76

On a distant planet, psi powers run wild, and only one woman can stop the world from going mad.

End City

BY PHYLLIS GOTLIEB

THE BAROQUE COLD-LIGHT SIGN over the old bar on Drent Street, half-obliterated by dust and grime, says something like *Jazzerama* or *Jazzmatazz*. Four or five men are hanging around smoking and spitting under the lamplight outside, and Asher comes up warily, but they are only saying a few casual words to each other. Nothing on their faces or minds but mild lust, a sniggering anticipation. Their eyes are aimed at their scuffling shoes.

The framed picture mounted in the bar's window shows a woman covering her face with a mask that has her own features on it, and beneath her mask the words: SHELEEN! SHE TAKES YOU WHERE YOU WANT TO GO! Asher leans against the wall with his hands in his pockets and doesn't look at anything in particular, but notices everyone up

and down the street. A couple of young women are crossing the road toward the bar, looking as if they have dared each other to come, a few walkers turn their heads briefly in curiosity, some stragglers are edging forward. There are others inside who have been here before, or wherever Sheleen was singing, some of them many times. The people waiting on the walkway glance at their watches and drift through the door in twos and threes. Asher takes another look before following them.

On the other side of Drent Street an elderly man is trudging along with his head hunched into his shoulders. His figure is dark against the cold-light glow of the shops, and there's a dark muttering in his mind, but Asher can't see his features or make out what's bothering him.

A sharp voice in his mind says, *No. That's not him.*

OK. Asher pulls away from the wall and goes into the jazzier-something. Captain SHAZAM! is sitting to the right in the back corner and Asher settles himself at left center so he can glance at the door and see the platform where a sitarist is idling on the strings.

Not in here either, SHAZAM! says. He is a near first-grade telepath who informs for the Department, much better than Asher, who has never even been graded, or wants to be. SHAZAM!'s name comes from his on-line activity, not his esp, which he has seldom cared to use officially, he's not interested in who stole the consacks or stopped the escalators to see riders fall down. A thin, blue-jawed, surly man, he always knows what women think of him without even having to esp, and his sex life is dim. And he is afraid of Sheleen, wants to be out of here. He is careful to let Asher know that.

I know it. Asher has ordered a bourbon and water to hold onto and finds himself drinking it to blunt his nerve-ends. Somebody else's smoke is wreathing his head in defiance of all the nattering signs, and the clinking glasses sound like explosions to him. You've told me often enough. He sees himself in one blink as SHAZAM! sees him, a scribble of orange hair, freckles on pink cheeks, brown dot eyes, naive and uppity, been staying too long in this kind of work. SHAZAM! is superimposing his own image again. Asher sighs and concentrates on Sheleen.

The sitarist builds up flourishes that ripple down through cadenzas into a deep insistent beat. A hand sweeps aside the blue velvet curtain: Sheleen comes out and closes it behind her in one swift movement. Her dress is gunmetal silk, and has long sleeves.

In front of her face she is holding the mask with her features on it — the music is becoming more elaborately chordeed now — and when she casts it aside on the step you see that her head is enclosed in a gold mesh shaped like a fencer's armet, its face plate fastened with three hooks. Her face and the glimmering gold of her hair show faintly through it — the drinkers take a breath — and from its edge at her neck thin gold ribbons cascade down her body to the hem of her dress. Asher knows that the mask is made of gold-plated copper.

She cries out in a clear alto with dark harmonics:

Love evolves like planets turning ...

ever to the burning sun!

scattered dust made whole in turning ...

atoms burning to be one —

see God tap them and they rust!

Love makes one and one be one ...

She half-turns, and the ribbons stream around her.

*Love is part of revolution!
Love's the one that turns the sun!
Love's no problem, it's solution!
Love makes one and one be one ...
Love and love make two be one ...
turning in the burning sun ...*

She raises her hands to undo the top latch of the gold mask,
*Love's the crown of evolution!
nothing further to be won!
it's no sin, it's abscolution!*
and the second one, you don't know whose pulse is beating, yours or hers —

passion burns from sun to sun!

— and the last latch! There is her face with its broad cheekbones bright with the flush of her own passion — and you know it now, you know everything, everything, what God meant when He created the universe, what He put you on this world for, what your life truly means, everything!
you and universe are one!
Whispering it now:
you and Love are two in one ...

HERE IS THAT DIAMOND OF SILENCE that falls when an audience has been taken a great distance.

Sheleen bows and when she raises her head her eyes lock on Asher's, her brows rise in little peaks and her mouth tightens.

ASHER DAMN YOU YOU SWORE YOU'D LEAVE ME ALONE!!!

Asher feels the top of his head lifting off. SHAZAM!'s head goes down between his shoulders, his teeth gritting. Asher can feel that too. No one else notices this outburst: Sheleen has learned control. Tsk, she fastens the latches, tsk, tsk.

She bows again, smoothes down her fluttering ribbons and slips away to a scattering of applause. The sitarist is already ripping up the octaves for the guitar and buccador-players. Everything Sheleen has said in her song is becoming faint now, like a fading rainbow. A woman in streamers with a cage on her head, singing like a bell. The world will not change for this.

The listeners who have clung to her voice are silent, keeping their thoughts to themselves, and the ones who wanted a sexual thrill wonder if they have missed something and pick up their conversations. In all of them there is lingering a minuscule shimmer of fear. Perhaps that is what they have come for. Excitement. Anything. Asher rubs fingertips over his sweating head.

crucies around in my skull i've gonna get her

What's that?

That one is him.

Asher is up running for the stage, flicks past the curtain before the musicians can say, "Eh, what —" or the bouncer give a blink. The bouncer slides after him, he is dressed in black like a Japanese scene-shifter, and very smooth. Asher, already rapping on Sheleen's door, flashes a badge.

"No!" Sheleen yells through the door.



of **BLOODRUNNER**, the caratata by Moises Beitwether based on the CJ Simpson Theme **FOR 2 NIGHTS ONLY** in Auditorium 3; and also a concert in the Garden Theater by the Imaginary Toads.

He crosses the walkway into a dark street much like Drent and looks up into the shadows, thinking, as he often does after these encounters, of all the unresolved aspects of his relationship, non-relationship, with Sheleen, from the moment when he'd met her years ago for the first time, not exactly met, his going from zero knowledge of her to knowing her too well, like an explosion.

BEGINNING THOSE YEARS AGO WITH Asher patrolling — next ward over, not here, all those years ago — for lost children, muggers, staggering drunks along the quiet streets around the Hospital, lit only by dim peepholes against the silky darkness of midnight-hour — the sudden *tak-tak-tak* clatter of steel-toed shoes on the cobblestones, seven, eight gray-masked shadow-figures running along the roadway, muffled gasping, a sob, the *CLANG!* of a drain-lid closing the way into the underground and the ticking of those muffled figures in tap-shoes descending the steps into the netherworld below the street, leaving it empty and silent — no. The horrifying mind-scream burst out there:

streetbare dark doors close and close and lock and close nobody I WANT! I WANT! I'LL NEVER — HELP! shut drapes pull shutters PLEASE! DON'T HURT ME AGAIN! DON'T — DIRTY BITCH'S MIND CRAWLING, CRAWLING LEMME ALONE YOU SONOFABITCH I DON'T WANT TO I WON'T WON'T SHUT HER UP! please, ONLY LEMME LIVE F'GOD'S SAKE! pulses in eyes red stars of heart thudburst thudburst JUST LET ME — please! you hurt — hurt —

He found her in an alleyway, on a garbage heap, nineteen years old, looked fourteen, dirty rag clothes half torn off; the trolls had been at her with all their force. No esp signal at all from them, they had helmets.

Asher was recruited to this business, half-proud and mainly fearful, very fearful this moment. He didn't know how badly she was hurt, or when — not more than a few minutes ago, or everyone in the neighborhood would have esp'd her, in spite of the white walls. He tried to lift her but she was strangely heavy because of the resistance caused by her terror. She pushed against him as if he had been her attacker, elbowing weakly, trying to kick:

bastards bastards HELP ME SOMEBODY! WON'T ANYBODY LEMME FOR GOD'S SAKE

breathe PLEASE

I'll help you, I'm here, he called out with all the strength his esp and voice could muster, but her moan rose like a fountain in the still air. "No, no!" he cried. "Don't fight me, please! I want to help!"

She couldn't or wouldn't hear. Her voice became a howl, lights went on in the buildings to either side of the alleyway. Asher knew they were not a signal of help on the way. In a moment they dimmed.

He tapped City Police on his remote, and the com button cracked in his ear. "Ouch! What's going on there, Asher?"

"Troll attack — and a wild one I can't catch hold of! I need help!"

"You in danger?"

"Don't think so."

"Stay then, we'll bring you in."

T'S SIMPLE. HIGGS-PARTREE LOOKED DOWN AT THE QUIET form, "no, not simple at all, but it seems obvious. I think. She's a broadcasting telepath who can't receive." She pushed aside her instruments, the eye-beam, the resonator, and laced her fingers together as if her hands could do no more. It was quiet now, and the City Police were gone. The girl was beginning to stir; Asher had thrashed her lightly, not enough to quiet that mind.

Asher considered what the words implied. "That's terrible."

"Please let me in," Asher says very quietly. "Just for a minute." He holds his hand flat out toward the bouncer, badge in his palm. "I'm not going to arrest her or take her away. Nothing. Just leave us, hey?" He tilts the badge so the light glints off it and the bouncer backs away.

The door opens sharply. She is standing with stone cold eyes, in control. There is no mask on her head, and her hair is hanging loosely. A few more gold highlights are in it than when he first knew her, and for some reason this gives Asher a pinch in the heart. He shrugs irritably, the sign for SHAZAM! to keep his mind to himself.

"I'm not —" he says in chorus with her, and recovering first adds, "No, I know you don't want anything more to do with Psychometrics —" Or me, he doesn't add.

"You didn't know I was going to say that!"

"No, I didn't, but it was easy to guess. We helped you learn control, it was the only way to save you back then, and after that you were free to go. You know damn well how I feel about —" He is inside the room now, suddenly breathless. Only glad to find her safe. He knows how she feels about privacy, independence, everything. He moves away from the abyss of feeling and licks his lips. "Somebody's stalking you." Too blunt, but there it is.

She says bitterly, "That's a change. At least they're not running away from me. They just want to take me where they want to go — it follows, doesn't it?"

"It's dangerous, Sheleen, really dangerous!"

"Is it? You and the Psych Works made me what I am, so I suppose we'll have to bear with it." She considers her image in the cold light of the makeup mirror, and sighs. "Sorry, I shouldn't have jumped at you." She is touching up her lip rouge. "I have to go on again in half an hour and I need a rest."

"For God's sake, take care!" He twists his esp in his hands, unable to keep himself from making foolish gestures, trying once again to reach her in the way he has never been able to do. "I can't force you, I have to ask you to watch yourself, stay out of crowds and away from alleys. I'm going now, SHAZAM! is trying to tell me something."

Don't give him my love. She means to muffle that but it slips out. Outside, the street is bare for the moment. SHAZAM! says, "He's gone. Disappeared."

"Do you have any idea where he is, what he's like?"

"You think he's gonna hang around and say, 'Here I am, joeboys, I'm a 175cm 50kg brown-haired Caucasian with a scar on my —'"

"Awright, I get it." *Shit.* Asher's Director of Hospital Security, not one of his beat cops, and doesn't have enough authority or powerful enough staff for tracking and patrols all over town. He's working on his own time, and SHAZAM! is doing him a favor. His finger's on the police button of his remote, but he has nothing to give City Police. A wisp of thought. *Stay home, Sheleen, stay home!* But she's deaf to the thought.

"There's gonna be more of them, y'know," SHAZAM! says. "Always one'll pop up like a bull."

"Yeh. I know."

Fruitlessly scanning for that small sickly voice, Asher walks down the street to the park where the Ironworks used to be, that's been filled by a complex housing small theaters and concert auditoriums. He comes by here every day on his way home, passing the glowing lights and the huge flickering screen that advertises *Sheleen at the Bistro! Thu/Fri/Sat: Free Beer Mugs!!!!*; a return performance

"Yes. It must be hell. It was lucky you came along before they were finished with her."

rotten, filthy sore and got to leak everybody knows I got to it — all the bastards and bitches and sons of bitches enjoying themselves because everybody

"Damned if we are," Higgs-Partree said. "We're here to help, girl, and don't you forget it. Try this." She pulled a drawer, reached for a film pack of metal rings that looked like a child's monkey-puzzle and snicked the tester on the battery until it beeped. "It's something that can help."

"No, no," the girl cried fearfully as Higgs-Partree opened the snarl of rings and moved to put it around her head.

"It's a cap, that's all, like the one I'm wearing, only not so fancy. Once you have it on, dear, no one will know what you're thinking." She tied laces under the neck in a busy flourish. "Sit up, now."

Suddenly there was a particular quietness that no one had ever felt before. As if her mind's workings had been in the background of everyone's consciousness for as long as they could remember. The girl sat up and her face fell into the lines of fear and suffering that had been smoothed out when she was lying sedated. Higgs-Partree let the silence ripen for a moment. "There ... don't you feel better now?"

"A little."

Her stormy gray eyes glanced around the ivory walls of a room shaped rather like a cell in a honeycomb. "What's this place?"

"It is the Department of Psychometrics, and you are in Assessment. What's your name, dear?"

"The Psych Works?" Asher was glad her head was bound up in copper rings. "No! I'm not staying here! You can't make me!" Compared to her thoughts, her words had a tight pinched sound, even when she was crying out.

"This is not the gas works, the Iron Works, or the junkyard, miss. It is a testing and distress center. Nothing to do with the police and especially not the Social Engineers either. I would never, on my soul, deliver anyone to City Council's pincers. But you were certainly putting out a distress call, and we brought you here to give you help. Let us ask a question or two, and you can go if you have where to go."

Without answering, the girl bit her lip and turned toward Asher, and as if his face were a mirror she was looking into, she let her features relax for a moment.

They were even features, not quite come to full life, and because of Asher's intense look she raised her hand to cover her bruised cheekbone. "Who are you?"

"I—I'm a patrolman, for the Department," Asher stammered. Her mouth twisted into a sneer, and he turned red.

"Don't go shy, Asher," Higgs-Partree murmured dryly. "I'll have to have a name, miss. You can't be anonymous here."

Asher clicked his daybook and wondered if he was really meant to be a thoughtcop. "Name, miss," he echoed.

The girl bent her head forward and murmured something that sounded like "Shleen."

"What, Miss?"

"I dunno how you spell it," Asher wrote: *Shleen?*

"A last name?"

"Jones," the girl whispered, as if she were giving away the whole plot. Asher wrote: *Jones?* then changed it to *Johns*.

"And address ..."

Her mouth twisted before she muttered, "Underside."

Asher's brows rose. "Squatter?"

Her head went up. "We have as much right to it as anybody!"

"It's not us who kicked you out, girl," Higgs-Partree said. "But somebody did, and I doubt it's healthy for you to go back down there. We can give you a bed for a night, and nobody will keep you against your will. You'll have your breakfast and a goodbye in the morning."

Shleen, if that was it, raised her hands and felt the cap of rings. "I can keep this ..."

"Yes, it's yours."

The girl nodded. "Eh. I guess."

"You don't have to shut up here, you know," Higgs-Partree said, kindly but still forthright. "You can talk as much as you like ... oh,

how old are you, Ms Johns?"

"Nineteen by the Clock."

"Min. Long time to live Under."

She did not answer.

Asher went off to write up his report in one of the cubbies of Psychomet that housed the Thought Police — more properly Peace Observation Patrol, a force that did not deal with felons usually, or by choice. *But if we find one we have to give him to the cops, no matter how hard we try to check the SocEngs, and she knows that.* She seemed hardly able to remember her own name, Asher thought, tapping through all of the Johns and Joneses in City Data without finding anyone remotely like her. Likely not her real name — if she had one.

Higgs-Partree looked in as he was finishing up. "I've found a bed for her tonight. It's in an alcove but I doubt she has anywhere else to go that's not dangerous. I simply can't believe she's been living all those years Underside in some filthy hovel among the sewers."

"They're not all filthy down under," Asher pulled his eyes away from the keyboard. "Some of them just want to get away from Authority, i.d. cards and evaluations — like this one. Some shops look the other way when they steal food." Feeling the beam of Higgs-Partree's attention, Asher hurried on. "Her mind doesn't work like any of the trolls I know. She could have run away from her people, or been kicked out and then found her way into a bad crowd. Now it looks like they've kicked her out. I can't find say i.d. for her here. Either she made up a name or it was just never registered."

"Yes, I believe you're right, Asher," Higgs-Partree sighed heavily. "I've only known one other with esp like hers, and him beaten to death by trolls — twelve years old. We can study this one, but we may never know her real name or be able to trace out that strain of the esp." She sighed once more and turned to make her way through the echoing halls and up the tiny winding stair that led to the cramped apartment she had lived in for — eh, so many years that Asher sometimes thought she had been born there. He knew she had no other life than whatever the Psych Works dealt her.

Asher felt the silence as he closed down and locked his office. Once the halls had vibrated with quick steps of doctors, researchers and medics, and the treads of the army of mechs that served them. Then Higgs-Partree had had real power. But over years and years, the intractability of the problems the Center was meant to solve had flung up its doorless wall, had left her a hapless guardian of children, and the Hospital full of echoes. When he stepped out into the hall, the only vibration was that of the cyclers, the ventilators, and the breaths of all the sleepers.

He took three steps down the hall before the dream burst in an explosion of reverberating howls and the migraine flickers —

off! ME! pressing in! around sewerwash STINK! under CHOKING-COLD *eyeworming* —

— of monstrous dreams. Asher felt Shleen's hands under her jaw pulling away the laces, in those dreams lifting off the helmet, flinging it aside. He reached to pick up his own, then checked himself, stopped. He had to keep her in mind's eye for Higgs-Partree's sake.

NO MORE! oh here what?

Hands rubbing the soft blanket, smooth sheet between fingers ... why here? who's wrong? turn blanket. bare feet, cold floor jeze sore down there — all over Milady Doc says: you here safe now — eh zatzoo? Duckfoot find where

Only a bay in the wall, not a room with a lock to hold her, peering out around the corner down the long dim hall ...

SHE'S DROPPED THE HELMET! That was Higgs-Partree's mind shrieking now, she in her attic, smocked nightgown billowing.

Don't let her go, Asher! She's frightened and has no clothes, and God knows what she'll do if she runs into the crèche!

((Oh! Oh! Babies brainburned, woman out of control mind-screaming in the street, stunned and dragged off by the police! Fed to the SocEngs! NO!))

PLEASE, ASHER! Old woman's sweating hands locked together.

He could press a button to send the one working mech after her with its sweat-sensors and padded clamps, and that would grab her shrieking and kicking. Wonderful. One sigh and he set out running up and down stairs and ramps on thick-soled shoes, dared not take the lift for fear of losing track of her mind in the metal cage.

snot-head Duckfoot gotta get outa here before he ... where?

Sheleen, who didn't quite know who she was, was lost now in the twisting corridors. Even Asher had lost her.

Stop, Sheleen! No, no thought would reach her. Asher beeped the control room where Sganos was sitting in whitewalled quiet, watching screen views of wards and hallways. "That wild one went and ran off, Gus, I think in West corridor. You see anything?"

"Um ... nothing here yet — whybellsja leave her loose like that?"

"We thought she would be glad to be safe!" Higgs-Partree cried fiercely, using her own beeper. "Mind your tongue, Sganos, and use your eyes!" She asked Asher, "Who's that 'Duckfoot' she keeps thinking of?"

"Must be one of the trolls that attacked her. She thinks he'll come after her. Dunno why when he kicked her senseless and shoved her out in the trash."

"Somebody running," Sganos called, "just a shadow!"

Asher and Higgs-Partree watched the corridor alongside Sganos, but it was empty.

"Page her, Sganos, but keep your voice down."

"Tell her to stay where she is," Asher said.

"Miss," Sganos whispered. "Miss Sheleen!"

NO NO hurts where he NO NO get me out-out-OUT don't touch me! sewer pipes gattersnipes washyer face with toilet wipes!

"What in heaven's that?"

"Just a blocker," Asher said. All the children knew that chant and all the blocking rhymes that gave them thin walls of privacy. Asher was young enough to remember. "She's too scared to stop now. I can catch up to her in a couple of minutes from here."

mask em with your toes shuff em up your nose

Asher was half a staircase away from West corridor, landed in two jumps and set off running, hearing his heart's thud under the jingling of Sheleen's rhymes. Three strides took him to the alcove where she had been put to bed, and the pool of dim light from the ceiling lamp picked out the faint copper circles of the helmet Higgs-Partree had given her. He paused for a half-second to pick it up, and kept running, half certain, almost sure he saw the flicker of her nightshirt down the hall. Too late. She'll be in the crèche before I can reach her.

Muttering: sewer pipes gut eh whatsis

Through the eyes of Sganos among a hundred screens in the control room Asher saw the door sliding open on soundless runners.

what — A round gallery with a silent escalator running down to a

floor where seven naked babies lay on absorbent padding in oval cribs arranged in a rough circle. All of the City's babies were born and tested at the Psych Works — all but the Undersiders — and none of these were more than a few days old: three sleeping, one whimpering, one gurgling, one sucking a fist, one having its belly rubbed by a nurse who had looked up in fear as the whitewall current broke with the opening of the door.

"God, no!" Higgs-Partree groaned.

"O ... " Sheleen was staring.



NABLE TO MOVE, ASHER WATCHED fearfully through her eyes, felt the round O of her mouth with her tongue pointed at it to make the sound. "Babbies," she whispered. "Tiny babbies."

Her mind was calm at this moment, and the whimperer became quiet and stared up at her with a mouth as round as her own. Asher saw the perfect bodies along with her, terror forgotten. *Maybe never saw one, if she was born down there. Many trolls bred Upside and went down; Sheleen's mind was absorbed in their fresh and glowing unfamiliarity.*

And the echo of a whisper in Higgs-Partree's mind: *Yes, they are beautiful ... thank God at least we got rid of the supernumerary tents. Because whatever had drifted into the City with air or dust all those years ago had brought a thousand subtle scourges, and some of the cures had been as fearsome as the diseases. Asher knew — she had never hidden it — that Higgs-Partree herself had been born with extra tests. The Social Engineers had made sure that surgery had removed both them and her reproductive capacity. She had worked most of her life to cut them out of the genome.*

The moment of stillness went on for half a beat, Sheleen focussed on the babies, the nurse's frozen gaze resting on her; then Sheleen took a step back, and another, until the door opened behind her without a sound and she passed through it. The babies slept. The door slid closed and its whitewall circuit ticked on. When she turned, Asher was there with his hand held out, offering the impervious helmet. She took it without a word and followed him down the hall.

Did you see what she did, Asher? Cabined them down completely! Higgs-Partree's mind was shimmering with eagerness: We might just find some use for that.

If we can just get rid of that tendency to set people rioting. Asher stopped until Sheleen caught up with him, and asked very carefully, "Who is Duckfoot?"

Her face flamed.

"Duckfoot," he said. "Called that from splicing around sewers? He's one of the trolls, isn't he? You're frightened of him."

"So'd you be." Her teeth were chattering.

"Maybe." He walked her away from the crèche slowly and she followed. She had nowhere else to go anyway. "Most everybody gets frightened as a lid from knowing what's in other minds and not being able to keep their own to themselves." He kept his voice down carefully because she was trembling so hard. "Here we try to train them to control it. If you can't tell what's in other minds, learning that is harder for you, I guess."

"Duckfoot hates everything. He used to say he loved me, but he just wants to hang on. He locks me out and no matter what I do, where I go, he drags me back in." She was clasp her self, trying to warm the chill of her fear. "I don't know where to go."

Asher put his helmet on quickly so that Higgs-Partree would not twig his urge to put an arm round the girl; this one was too risky altogether. "If you stayed here for a little while it would help us. And if you keep the helmet on it'll be hard for anybody to find you —"

Down the hallway the clattering interrupted him, rising up where the gallery opened on the lobby.

"GO JUMP IN THE GARBAGE YOU SHIT CAN!" The harsh male voice, then two crashes and a scrabbling rattle. "You go bring her down right now!"



As her dinged his remote key for Security. Sheleen opened her mouth to scream and he clammed it with his hand. "That's your boy friend, is it?" Two nurses had come out of their doors, one of them blue-jawed and half again Asher's height. "I guess I spoke too soon." He took his hand away.

"Damn you, he's not my b —"

"Yeah, but it's Duckfoot down there, isn't it?" he whispered. "You go with the nurses and don't scream. Please, Sheleen. You'll be safe." He let go of her and ran down the hall toward the gallery that opened on the entrance hall. He rested his arms on the railing and looked down.

HE FLUNG-BACK OUTER DOORS WERE still shuddering in their sockets. The secretary robot beside the doorway had been heeled over, driven halfway into the floor, and was giving out its death-rattle. The three figures staring up at Asher were faintly yellowed by hallway lamps, and backlit by the early dawn that seeped in dimly from outside. Three male figures, Sheleen's age or not much older, wearing wash-blue deslins. The narrow-faced one in the center yelled, "You get her down here!" He backed up and gave the robot one more crashing kick for emphasis.

"You want another go at her, Duckfoot?"

The kicker ran forward again with crunching steps. Studs on his boots, probably, Asher thought, so much for ducks. He realized that what he had thought was red hair on Duckfoot's head was a helmet of rusty nails twisted into a mesh with its battery hanging down on one side like an earring. Asher had never seen nails being used except during schooldays in old historical screenies about life on Earth.

"I ain't giv'n'er to you!"

"You just kicked her out. What do you want her for?"

"I'm calling the police," Sganos buzzed in his ear.

"No, Sganos, no! Not the police!" Higgs-Partree cried desperately.

"Wait a minute," Asher said.

"What're you letting him yammer for then?"

"We can handle this," Asher muttered. He was uneasy with whatever Higgs-Partree might have on her mind. "Gimme a minute."

"Calling the blues won't do you any good!" Duckfoot yelled. "We can take care of them!"

"Eh, give it a rest already, Duck." One of Duckfoot's partners, a shorter, older man with a scruffy beard, pulled back toward the doorway. The other partner, even hairier, was wearing a standard issue helmet, but this one had none at all. On an impulse Asher took off his own. No one attacked him.

Duckfoot turned on the straggler. "You sweating it, Roach?"

Asher and Roach looked at each other one flashing second and the man said, "This just ain't gonna work, Duck." Asher wondered if this partner here was beginning to feel a little too old for Underside, but didn't push it, didn't let the thought near the surface of his mind.

"You think you know something I don't?" Duckfoot rammed his foot down on the floor and Asher could feel the cracks raying out from his bladed shoes.

"I think she doesn't want to go with you, Duck." Asher, being

upstairs, had the high ground and his hands splayed on the balustrade ready to propel him downward.

"You let her come out here and say that! Sheleen honey, loves, you come out and tell me that!"

Asher turned his head to look at Sheleen and was jolted to see her struggling with the guardian nurse, and yelling, "Lemme go, damn it!" Stamping with her bare feet, not seeming to feel pain and sharp elbows thrusting like daggers, she pulled away and plunged forward. Asher had to catch her or she would have flung herself down the stairs, and lost his advantage of height or anything else, with Higgs-Partree babbling in his ear and Sganos yelling, "Get the goddamn police! I'm calling the Social Engineers!"

"Let me go!" Sheleen yelled.

Asher wondered if she was like this all the time, Underside, and why in hell Duckfoot would want this.

"No!" Asher ducked her furious elbows. "You got the cops on you one minute from now if those trollheads aren't out of here, and I want them out of here. If you can nuke that cleur to Duckfoot, you do it."

"I'll do it," she said through her teeth, and Asher let her go, finger by finger. He kept his eyes on her as if she might explode. On the ragged twists of her hair bursting out through the copper rings, the set of her bruised jaw, the clench of her fists as she cracked them against each other. Asher was not afraid of Duckfoot, being well-fed and well-trained in a world of few weapons, but his world spun the same every day, and Sheleen was not the same. Out of the corner of his eye he saw Roach pulling on his helmet.

Sheleen yanked the strings, wrenched off her own helmet and hurled it away — "Hey!" Asher yelled — and cried out in a low dark voice, "You get out of here you dirty thing, there's little kids here and their shit's too good for you!" Lightnings crackled around her — maybe only in Asher's imagination.

"If I ain't good it's your fault!" Duckfoot howled, dancing in rage and longing. "Think me good, Sheleen! I'd be good if it wasn't for you running away from me all the time!" He pulled off his helmet and clutched it to his breast as if it was his live red heart. His mind rang like a high-speed ventilator. Asher's hand moved down to his own helmet. That noise was too much.

Sheleen looked at Duckfoot. She let her jaw relax and said, "I loved you ... I truly loved you ..."

Suddenly everything was wrapped in gold mist, haloed, glowing. Asher's skin pricked. The corner of his eye registered that the man called Roach had slipped out of the doors and away, but his spirit was trapped in the shower of bliss, floating up and out in an exultation of ecstasy no drug could create —

*cracked! into glass daggers —
bloodsucking FIREHISORE tearstreaming help! nobody gives a — PLEASE! LET ME —*

She screamed then. "NO!" Took a deep breath and said in a quite normal voice that had a resonance of agony. "All I ever did for you was make you crazier. You blow yourself up and get to think you're Big Lord Shit and got to beat me up. You and the other turds." She swung her head around at the gaping faces, sneering. "Everybody else wants it too."

"That's enough!" Sganos was thumbing the red code button yelling, "I don't care what you say, Doctor!" Asher winced and pulled the comm button away from his ear. "Council will have my ass, god-damn it, and yours too!" and the alarms began ringing. Duckfoot let out a yell and jumped back once, cramming his helmet on his head, but before he and his last faithful troll could make any other move or Asher aim his stunner, Police were streaming through the doors, letting in the morning lights, Higgs-Partree herself, fully dressed and white-coated, was running down the hall yelling, "For God's sake, Asher, don't let her go!" Asher, still half-stunned by the gold mist, did not even see the police taking the trolls away and lost sight of Duckfoot's half-furious, half-tragic face.

Higgs-Partree picked up the helmet where Sheleen had flung it and tied it with a double knot under the girl's chin, it seemed like the twentieth time, while Asher took her by the arm and drew her down the hall. She was very pale.

Higgs-Partree dinged her comm: "Please, Sganos, don't fail me. Tell the Police, crazy troll, young woman raped, needs treatment. That's all of the truth." She wiped her face with a big square handkerchief and pulled on her own helmet. "Asher, I have cleared a room for her, will you take her there? We can spare Bannerjee to stand guard. She needs sleep."

Asher did not even bother thinking. *What about me?*

"And after that you can go home, Asher. You need sleep too." By now, Higgs-Partree did not need telepathy.

Asher went home to his compartment and sat down on his bunk. He couldn't move, just crouched there with his skin prickling. After a lifetime of waiting for something to happen, everything had. It was like being drunk and stoned and high and his mind skimming all over the universe. He had never felt so alive. The Shleken Effect. Some fear underneath that too. He recalled coming down off whatever forms of ecstasy he had been able to scour out in his teens, too familiar with the sickly letdown, hollow under the breastbone, that threatened him now that the gold mist had faded. And he was scared of Higgs-Partree, she'd gone gaga over Shleken at first sight, made her an instant secret project, made him her unwilling confidant. Going to bring down Authority on him and everyone else at the Hospital. Her, she'd lost everything she had to lose except a scrap of her old age; he hadn't. Thinking like a troll — maybe. Yet with all of this rolling around in his skull he'd never felt so alive.

EVEN YEARS LATER, ASHER DOES NOT always go over all of this when he walks home from his Hospital office. Tonight he is preoccupied and sits on a bench in Clock Square opposite his apartment, yes, it's an apartment now that he's Director of Security, not that half-hexagon in the Residence where the bunk crippled his back and he couldn't get both hands in the wash-basin at once. On this side of the square is the apartment where Shleken lives now, nearby and painfully far away.

He looks up at the Clock, a revolving globe set on a tall column. Slowly it counts the hours, now poised just on the edge of midnight-hour, the twenty-fifth, more slowly counts the years, now edging out of Year 275. It has wound seven years since that night. The globe is a representation of Earth, but it does not count the forty-seven years of Earth's silence. He bends his head further back and looks upward where the lights are being dimmed, and he cannot quite make out the hexagon frames of the dome's roof, half a kilometer above him. Nothing there to help him. Half of the column is wound with ivies that obscure the name of the City, and at its base there is a wire frame woven with gaudy cyclamen flowers placed here today to commemorate the death of the First Councilor, a faded remembrance trotted out once a year.

The people of the City are walking home quietly from their mild amusements. Whatever trolls are left razz around the SexWorx under OldTown. This is the City center; somewhere in its circumference a mind tightly bound in the overgrown scar tissue of anger thinks:

I no can't take it no longer; that evens around, I gotta —

The day after that blazing night Asher slept until noon, and when he woke found everything as gray as always. His euphoria had faded; the uneasiness remained. Passing the gallery where all the excitement had occurred, he saw that overnight a new floor had been poured and one of the hemp-field robots redirected to gate-watch duty; it looked awkward and skeletal. When he went into the cafeteria for breakfast he found Shleken at a table in the corner playing poker with Mbamba, a nurse on the day shift. Both of them seemed fairly grim, Shleken in her helmet and her hospital fatigues looking like an alien prisoner-of-war, Mbamba watching her as if she was about to lay down four aces.

Asher sat down and said, "Yeah, I know what."

"They can't keep me here," she said through very tight lips. Her face looked sharp as a carving knife. She hugged herself and shivered. "Where do you want to go?"

"It's not all trolls Underside."

"I know, I've been there." Watching her, all set to explode into blue starbursts and bolts of lightning, he thought she must be hell to get along with, even while he saw her scared and fearfully alone.

She gave him an asking look but before he could turn away the question Mbamba said, "If you aren't going to eat, God Himself wants you in Room 324." Asher ate.

Higgs-Partree was not quite hugging herself with excitement but her fingers were tightly gripping the edge of her reading-lectern. "Listen, Asher, you saw what she did last night. She kept those babies quiet, she made everyone bared-headed so euphoric it was better — and maybe worse than — the most powerful drug. We can use someone like that. We need her, Asher." She'd probably been awake all night, she gave off a hyper aura. "I know we can't keep her if she's not willing, and there may be trouble anyway, but —"

"You think she can calm the trolls down?"

"I'm sure she can't. The trolls have got twisted because there was no use for them. If we could find a use for them that would convince them that's what they want and need — then they'd calm down. No,

we need somebody to pull us up. Everyone around here has been depressed so long they think it's how life is supposed to work. I think she has something that could help give them hope."

Asher, remembering the dizzying gold mist, said, "I think she could be dangerous."

"She'll be dangerous to herself if she doesn't learn control. She could be killed, or maybe even kill if she got angry enough. She won't learn control from Duckfoot — he hasn't any. If she learns it from somebody as twisted as he is but more intelligent —"

"Yeah, I see ..." He swallowed. "She'll really be dangerous."

"Let's work on it, Asher. I'd like you to be my security lookout for her —"

Babysitter. He was leery of that. "I —"

"You found her, Asher, and nobody knows much more about her than you do. I know some PsychWorks people here who can help —"

Before she could finish the sentence, her comm beeped and she touched the button in her ear. "Yes?" Asher made a move to go, but she held up her hand: Wait. Then a flush swept over her face and drained as quickly. She said faintly, "Did you," and pulled the button from her ear. "That was Sganos," she told Asher in a ghostly voice. "He said he wasn't going to be a party to — to whatever scheme I had in mind for the girl. A frustrated man — he blamed me when he wasn't promoted — and now that he has the opportunity ... he's calling the Social Engineers to take her in. He thought it was only fair to warn me ..." She touched a button on her keypad. "I won't give her up to them."

You've got to help me, Asher.

Was that her thought, or his own projected one? The chill hit Asher on the back of his neck, and slid down his back like a snake. Her eyes were on him. He sat fixed in their glare and licked his lips. She moved closer until he could smell her dusting powder, the same mild scent that soothed the babies, hot with her fever. She whispered, "Asher, do you know what the word 'eucelate' means?"

He said slowly, "I think so." She's gone crazy. He pushed that down hard, but she was beyond caring.

"Yes. It means having everything valuable taken out of you." There

was a zzz, and the com screen flared on the wall. It showed Sheleen and Mbumba riding up the escalator. She watched them, following Sheleen's every movement from the twist of her weary shoulders to the awkwardness of her uncomfortable step. "They could rip out her womb the way they did mine, they could lock her into a helmet for the rest of her life, they — Asher, I want you to take her out of here, anywhere, just long enough so that I have a chance to talk to them. If you can't do that, I will do it myself, and let the devil take them." Without waiting for him to say yes or no: "Would you bring her in now, Asher," still in a whisper, as if the Social Engineers could hear her anywhere.

He found Sheleen on a bench in the corridor and set Mbumba free of her task. Higgs-Partree wasted no time. She motioned Sheleen into a chair and said, "Miss Johns, someone has called the Social Engineers to speak to you —"

Sheleen pulled back as if she had been hit. "You're not gonna give me to them?"

"No, I am not."

Sheleen let out a tightly held breath. "What do they want me for?" Being the live thing in this dead place, Asher said to himself.

"I believe you have an ability that can help us make the world easier to live in. They may not agree with me, and I'd like you to stay out of sight until we find out. I want you, please, to go along with Asher and do what he tells you —"

"I'm damned if I'm gonna let him screw me!"

Before Asher could open his mouth, Higgs-Partree said, almost sadly, "It's a pity you've got blind eyes, miss, or you'd know the last thing Asher needs is even more women to take advantage of him." Asher had to agree with that. "Asher, I don't know how long it will take, but I'll leave a message for you at the registry in Ironworks Park. You can access it with last year's code number, it hasn't been re-assigned yet. We've got to hurry. Here." She opened a drawer and pulled out her finest mesh helmet, her hands were trembling, and thrust it at Sheleen. "Put this on, dear. It's more powerful, and will look less conspicuous on you. Now go," she turned to her screen and keypad as if she were alone.

Going down the corridor with Sheleen Asher heard the door slide closed behind him, shutting him out, and was swept with bitter feeling. He doubted the SocEngs would bother Higgs-Partree. She would take her way out of it, find a way to accommodate Sganos, keep the rest of the staff supporting her while he, the new raw recruit, naive or maybe just stupid, would have his nuts cracked and his brain washed. Thinking like a troll again, part of his past not buried deep enough.

Sheleen looked quite different from last night's ragged waif, more woman than scrawny girl in hospital uniform and with H-P's expensive helmet smoothing down her hair. It was barely possible that someone might take her for a student nurse. "Where do you think we're gonna hide here!"

"Not Underside, it's the first place they'll look." He was heading for the freight elevators, and thought he heard an even more ominous clatter. He knew how the SocEngs' shock troops paraded with their detainees: two men and a sniffling robot swathed in metallic glitter and oversized stannars, making an authoritative racket — especially Underside among the vents and sewerpipes. Even the Police stayed out of the way.

Three doors and two winding hallways led to the elevators, but they were loaded and moving. Asher jumped on the narrow escalator going down. Nothing else was moving in this section except the robot laundry bins. The hospital, haunted with past hopes, was ghostly, Higgs-Partree one of its ghosts.

"That woman's crazy." Sheleen tripped on the worn treads and half-fell, clutched his shoulder with a hand like a bird's claw. "You know she is."

"Yeh."

"Why'd you work for her?"

Asher didn't want to launch into the drama of Higgs-Partree's past. "I spent a rotten year overseeing the sheep station and a worse six months in the protein factory. She smells better, for one thing. Now

let me try to think where to go." Briefly he thought of taking her to one of his police friends; police were a rung lower than the blustering SocEngs, and hated them. A dumb idea; it would give H-P hairballs. He knew where to go all right, just didn't want to go there ... and there was nowhere else.

The escalator led to a service alley that opened into Odler Road two wards away from the Ironworks Park, a place Asher meant to avoid. The people in the streets were wearing clothes in subdued colors like his own gray-green, and the afternoon shadow was rising. No one gave Asher a hello, and he walked like everyone else with his head bent slightly forward and his helmet glinting dully in the fading light. He was careful not to hurry, and drew Sheleen along with him by a touch on arm or shoulder never maintained long enough for her to shrug off or brush aside. Though he could not reach her with esp he was learning her style and pace.

"Where we going, for God's sake?"

"Where you'll be safe." For himself, he didn't know.



SHER LED HER PAST TWINKLING shops and cafés, heavily laden escalators, warehouses where robot loaders glided in and out; Citizens' Gardens green with twenty-five kinds of lettuce, worked by as many old men and women who did not look up;

Chapel Row that housed a hundred and twenty-seven religions — Asher stopped there to sit on a bench with Sheleen and let her catch her breath.

She moved gingerly. "First I get ripped up and now —" she muttered, and caught herself, biting her lip.

Asher thought he knew how much she hurt, but he had become very frightened and angry for the first time in a long while, and he had no patience. "This isn't part of my job."

"You don't have to be so goddam peeved at me!" she cried. "I never did anything to you."

He caught a blink of his face reflected in red stained-glass and he looked peevish enough. "You're right. Sorry," he said. They listened to the choirs, bells and wind chimes peacefully for a few moments while the shadow deepened and the first of the floods blinked on. "Time to go."

The road led through groves of trees where fountains rained water on the leaves and no birds sang, past the fields of industrial hemp, the vineyards, the corn-fields, the grinding mills, the distillery that produced bourbon, the cereals factory. Asher drew Sheleen along the pond where the carp were raised and tended by robots, and past the well-sealed sewage processors. After that came the arc of a huge concrete wall. Asher looked up, where the wall ended at a great height, and the hexagons began. A misty light glittered through the acrylic panels.

"Where the hell are we?" Sheleen wailed. "This is nowhere!"

"Yes," Asher said. "But over there, in that shadow, there's escalators." They rode up two narrow high escalators and then climbed a stair that was almost dizzying; its landing was a small room with a door. "That's it ..." He felt his voice turn dull, a silence drawing down around him, as if he had stepped into a closet of dead air. He sighed, and clenched his teeth to ride over his fear.



The door was a big gray slab set back in the wall; an alphanumeric keypad was mounted on it and Asher dit-ditted ten of the keys without having to shake up his memory.

"How'd you know to do that?"

"It's my CiteZNumber. Anybody who wants one can get one."

Shelleen looked doubtful. "That number's on record, then, and all the SocEngs will know we're here!"

Asher stepped back while the door buzzed, snicked and slowly opened outward. It was as deep and heavy as the door of the safe in Records Vault, and it squeaked, opening from the dust that had gathered in its framework. Beyond it was another door with a sensor panel mounted at shoulder height. "No they won't. It's my i.d. from fifteen years ago." He planted the flat of his hand on the sensor panel.

The second door opened inward, smoothly. It led to a walled ramp, going upward, dimly lit from beyond. There was a small foyer just inside, and Asher paused; the air was a stale twenty degrees and he sneezed. Shelleen followed and the doors began to close. Asher said, "You can get out any time you want. The doors open soon as you come near them. One more thing. There's two rooms to sleep in here, we each get one, and I don't walk in my sleep."

She let him have the last word, either from fear or weariness. He climbed the ramp.

A light went on in a great glastex dome. It was the sun.

"There's Overside as well as Underside," Asher said, feeling the cold sweat run down his ribs as he took the last step to the top of the ramp and stood on the floor of the Observer's Room.

THROUGH THE GLASSY DOME THE BRASS light of the sun slammed down on the sulfur plains and manganese mountains of the world, and beyond the fearful deep blue the sky was swept with cold white stars. The view was of three hundred and sixty degrees. From forty-five to sixty-five degrees

above the southern horizon glowy rings of dust and stones wheeled in silence just above the rim of the sun which had freed itself of their shadow. From due south to due west on the horizon huge machines taller than the dome clawed the sulfurous desert to forge and build (their vibrations lodged in Asher's body as they had done all the days of his youth).

Watching from this outpost as a child Asher had believed that the machines moved in mysterious ways, like God, and that their purposes might never be known, but as he grew older he had learned that City Council was the god of machines, and when Council wanted blankets, bread, calculators, velvet jackets, paving stones, sewing needles — it got them.

Even now as he watched the rising and dipping of the great steel jaws they seemed like the monstrous prehistoric carnivores of Earth that had frightened him on schoolroom monitors. He had never shaken his five-year-old's fear — and now it came back exponentially multiplied — that the dark jointed beings with their jaws and their far-reaching arms and pincers would turn and look back, find one more morsel, tap one knuckle on the fragile bubble of the dome and send him screaming outward on its explosion of air. *There's Overside as well as Underside.*

If he had been alone he would have gone down the spiral staircase in the room's center to the small windowless apartment where he had lived with his father for nearly seventeen years, and stayed there.

But Shelleen was staring at all three hundred and sixty-five degrees. "What's this place for?"

"It used to be a watchtower. It had telescopes, direction finders, signal lights, I dunno what they were expecting. Aliens, maybe. The god from the Machine to get us out of all this. There sure isn't much they'd want from us. My father was the last of the signallers."

"It's beautiful."

He and Shelleen looked at each other. She had been almost plastered against the panes, moving from one to the next as if it was a new window, with another new world to look at. "What's the matter?" she

said. "You look sick."

"Beautiful?" He shook his head. "I grew up in here."

"But you get to see everything, the sun, the sky, whatever that stuff is floating up there. You could get Outside from here, I bet."

"Not if you wanted to breathe. There's nowhere near enough air. Not for us. It's got a bit of air, some saltwater lakes, a bunch of lichens and maybe a few worms."

"You're so scared of it," she said, puzzled.

He swallowed. "I only get scared when I'm here — because Outside, it's all so naked. You've lived Underside and you can't read thoughts, so you don't feel it. Sometimes it spreads in the City like a panic, a fear you can't stop. The college profs call it The Great Dread when they talk about it on the vid, and telepathy makes it worse. That's why the Psych Works wants to get rid of the esp."

"Duckdoot says it's good for sex."

"That feel-good stuff you do may be — for him! You're lucky you couldn't esp him."

Asher had never made love without a net.

She snorted. "But what's everybody afraid of?"

"Being the only ones in all this space, and so few of us. What's fifty thousand? Just barely a city, and forty-seven years of not hearing from Earth. That started before I was born, and kept growing. Earth may be destroyed and we might never be able to go back."

"We've been away two hundred and seventy years by the Clock. What would we want to go back for?"

"I can't help it if you don't understand. Forget it!"

She shrugged. "Is there anything to eat in this place?"

"We'll find out soon enough." He went down the stair and she crept after him. The apartment's two sleeping-rooms and tiny kitchen were empty of furniture except for the hammocks and an old electric kettle. Asher switched on the lights and found some packets of biscuits and synthajerky. He pressed the knob on a dry tap. "Can't eat much of this stuff if there's no water."

"Ate it all the time Underside," Shelleen said. "Some people used it for traders. Not the trolls, they had the ganja." She climbed back up to watch the swelling light of the stars and the shadows of the rings. Asher called the registry in Ironworks Park, but no messages had been left for his i.d. code. He took his scraps of food and followed Shelleen upstairs.

The observation platform had been stripped bare of desks, screens, chairs and everything else. Asher squatted against the iron railing of the staircase gnawing on the jerky and watching Shelleen. She had taken off her helmet to shake her hair free and comb it with her fingers. On a cautious impulse he took off his own. As he had half-expected, the stars through her eyes were brighter, and the sky a deeper sea of space.

Asher said, talking quickly, the words forced themselves out of his mouth, "I never knew whether being alone up here made my father weird or he started out that way. There must have been something off about him to bring a wife and baby up here. All he ever did was sit with all the instruments around him and wait to hear from Earth or the Aliens. He got paid nearly as much as City councillors, but this isn't a place where you'd want to own things, and there's nowhere to keep them."

"When I was around five my mother couldn't take it any more and went to live on the other side of town. I used to visit her for a while,

and then I didn't. When the school jitney would pick me up by the escalators the kids looked at me as if I was the Alien. My father started drinking seriously and got the d.t.s at night." He shuddered. "One night he either fell or threw himself down the stairs. The day he was cremated I went Underside, a bit crazy myself, and ran with the trolls, not like Duckfoot's, but really tough ones. I dunno why I picked them, one or two I'd been to school with. I wanted to get away from space. I was sure of that. I carried an iron bar and stayed to one side.

"Maybe you knew one or two of the anthropologists who come Under every once in a while to study the Tribes, collect dialects and like that. There was one running with our tribe, and I got to know him. After a while they picked a fight with him over some stupid thing and killed him. I came Upside and never went down again. Since my father's been gone, nobody wanted to live up here and go crazy so they gave up watching." He cracked his knuckles and wondered why he'd bared his soul. "It's strange that everything is so much like the stories in all those old screenies from Earth."

Sheleen said, eyes on the sky, "I never got registered and I don't know who gave me this name. I never knew who my mother and father were, either. After I was born they decided to come up from Underside and passed me off to a couple who were going down. When that pair thought they couldn't take care of me or just got tired of me they gave me to some woman they met at a hash party. That's what she told me before she died drunk. I don't know how many times I got traded or if this story is true." She half-turned toward him and added, "You must be awfully scared of going crazy like your father."

"I—I guess I am."

"Yeh. Maybe there's a lot of other people like you." She took one more long hard look at the universe outside, brushed the crumbs off herself and went downstairs.

Asher tried once more to reach his contact, and when there was no answer, followed her down. He slept without the helmet, his nightmares would not disturb her. But he found himself alone in a tunnel of dreams where brightly colored hexagons sang:

*I want to pick a yellow stone and skin it in that sea of space ...
I want to reach out for a star and burn its kiss against my face*

— though this seemed quite natural to him, in the dream, it was frightening enough that he struggled to wake, and as he did a hot whiteness flared against his face and his lower lip stung and stizzed. Then somehow he sank back into sleep and when he actually woke to see his doorway lightened by the sun he heard an actual voice, Sheleen's, singing in a vivid clear alto:

*Don't you send me back to hell, man
don't you tell me it's gonna be all right now
don't you tell me it's gonna be a wonderful day
all my troubles in the trash-can
no, man*

He slid off the hammock, groaning, and as the sound came from his mouth realized that he had a blister on his lower lip. So much for sleeping without a helmet. Her room was empty. "Hello!" he called.

"I'm here," she said from upstairs. "Not many places I could go." "I thought I'd heard all the songs going around, but that one's new to me."

"I made it up for Duckfoot."

"Eh." The ability was surprising, but not the content. It took effort not to make a snide remark.

"I loved him," she said.

Past tense. He nodded to himself. "Not much use offering you breakfast without water." His mouth was dry and sticky. "We've got to get out of here and find some place else."

At the last sss sound he spoke, the comin rang. He felt sweat in the roots of his hair, and sighed. "Yes?"

"Hello, Asher?" a loud hearty voice said. "This is your neighborhood Social Engineer. You may not realize this, Mister Seven-three-tee-eight-nine-zero-theta-four-five-two, but you have abducted a ward of the City State, legally ceded by her guardian, Doctor Higgs-Parthree, to our protection. Better come out fast if you don't want to eat break-

fast in a cell. Just open the door, we're right outside."

IN SPITE OF EVERYTHING SHE HAD SAID, HIGGS-PARTREE had crumbled, and there was nothing to be done about it. She was a helpless old woman. Next time Asher saw her after that she still had a livid bruise on one cheek-bone, and her eyes were very red.

"Don't blame me, Asher!" she cried, and wept again.

"I'm not blaming you, Doctor." What would be the use of that? He'd gotten away with a cracked kneecap, courtesy of the SocEngs, while he was trying to keep them off Sheleen, who was scratching his face to tatters.

The jail was full of trolls, so the SocEngs had put an anklet on him until his case came up. In the meantime he was not allowed to work or even wear his helmet; his lodging was sealed and for lack of other choices he had to stay for a month in what was called a Hav'Nots' Hostel, or Jailbirds Cage, and other names, where he was kicked out early in the morning and let in late at night. Rather than dragging the heavy anklet around the City he sat on a bench in the Square most of the time with his arms folded, trying to ease his wired kneecap so it wouldn't hurt, wondering with dread what was happening to Sheleen and not caring much what happened to him.

The anklet, bright red enameled metal, was supposed to be a badge of shame like the stocks, or a brand, or a scarlet letter, but almost everyone recognized it as too much rough justice dealt by the SocEngs. Though Asher got pelted with the occasional corn-cob or fruit core, or harangued by some furious soul-saver, more often passers left him with a half-sandwich, a candystick, a bulb of soymilk. They gave these in an offhand way and did not hear his thanks. When he lost appetite for the offerings he gave them to the children who gathered in knots after school-out to see what a dangerous felon looked like.

After several weeks of this someone sat down beside him for the first time. Asher kept his eyes straight ahead and braced himself for another harangue, but his companion said, "Ah —"

Asher turned his head, stared for a moment, and recoiled. "I know you. You're the one Duckfoot called Roach!"

Roach raised his hands and said, "Uh-uh, no, man! I never got inside that Sheleen, didn't go near her. Don't ever think it, I'm scared shìtless of her."

"I have nothing against you," Asher said. "You tried to shut Duckfoot up and keep him off Sheleen." He realized that Roach had clipped his hair, trimmed his beard and was making an effort to look respectable. Instead of denim he was wearing a black cotton tee and flared pants of natural hemp linen. Asher wondered why he had no helmet on. "I owe you one."

"No. You let me get away without ratting on me. He'd do his best to kill me when he got out and I'm too old for that."

"What'd you want with me? I'm next best thing to being in jail."

"I need a job — I mean I don't want a J.O.B. with a timeclock, I want work and some cred I can buy with instead of crawlin' up here from Underside and snarling it —"

"I'm not even allowed to work — and what kind of work can you do?"

"I'm the best ESP in town," Roach said unaffectedly. "I don't need a helmet because I'm a good blocker — except with that — with

"Wait, Mister Captain SHAZAM! — I bet you wouldn't know who gave us away to the sockers."

"Nobody had to. It's on record you lived up there fifteen years, it's your home, man, everybody wants to go home!"

Next morning a policeman Asher had never met came around to the hostel and unlocked his anklet. He limped for a long while with that crooked knee.

THE CITY COUNCIL COULDN'T HANG HIM WITH any charge except trying to protect a victim of violence from perceived threats of further harm, and his punishment was time served.

Sheleen, who had been muffled in a locked helmet in a room with bars, was freed and back in Higgs-Partree's care after a month of tormenting her inquisitors with a line of invective that turned their faces red and blue. Bareheaded she frightened them; caged, she was an enigma, foul-mouthed or not. Asher stayed away from her. He didn't need any more scratches.

Some time later, after finishing his night shift he took the jitney out to the edge of town where those long narrow escalators were, rode them upward, climbed the dizzying stair. It was not as frightening as sitting on a bench with a broken kneecap. The doors were open.

Wondering at this, he hesitated at the edge of the foyer, and heard a thin voice singing:

*You pulled me out of my hell
and dragged me into yours
you bound my hands with burning chains
and double-barred the doors —
some WHO/body/coming closer/stop DON'T want/no DON'T/nobody
lea/me/Jesus/kake/alone!*

Heart beating faster, Asher waited. He could not see her from the foot of the ramp. The frail voice rose again:

*I want to live right, see straight
run into the light*

*You pulled me out of my hell
not gone I smell your dirty sweat
"Leave me alone Asher damn you!"*

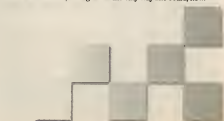
Asher ran up the ramp, the marks of her scratches tingled on his face. "You don't talk to me like that! I did nothing to you but try to keep'm off you and they broke my knee for it! I'll leave you alone and you can have this damn place all to yourself, but don't you ever tell me or anybody else I rattled on you!"

She turned and slunk against the panes as he came at her with his crock-kneed run, but he stopped well short of her.

"I'm sorry," she whispered. "I didn't realize they'd hurt you, I'm sorry, I was so scared I hit out without thinking."

There was nothing else to say.

He minded his own business then, next seven years, said *g'morning* and *g'night* every day, trying to keep his eyes away from hers — *have you ever looked at me and wondered what I was thinking?* From an aching distance always lengthening as he rose to higher positions, he watched the engines of the City fix her teeth, brighten her hair, cage her, mask her, tame her; Higgs-Partree unbuilding her dreams for Sheleen, saving her in the only way she could, now.



Sheleen, and maybe Doctor H-P. I can find out things you wouldn't believe, and nobody looks at me twice."

Asher looked at him hard. "What wouldn't I believe?"

"Who's screwing who on Council, who's blackmailing them, what's —"

"Stop, for God's sake! You may be able to block that stuff, but I can't!"

"No problem, I'll stick a lock on you. I just wanna know who'd like to buy it."

"The police sure as hell would, but I'm in the shit with them. I'm just no use to you, Roach."

"I already peach for the cops off and on. Why d'you think I was sucking around that scumbag Duckfoot? I was ready to ring the bells any second." He shut up, and he and Asher locked eyes for a long moment. "No, man. I couldn't stop them jumping her, I was way away ducking three knives and a couple of bottle-axes. Your old gang, man, thought I emptied their ganja locker. I blinked it but I couldn't get near her." His mind was open.

Asher shied away from it. "All right, then. You wouldn't've dared come near me if you had ... but if you've already got some work —"

"Not enough to eat on, and they wanna keep me Underside cracking troll gangs, that's all, and I'm damned if I want my skull split over a twist of ganja, I'd rather have a job like yours. You get a chunk of meat once in a while instead of a sheet of protein worth feeding carp with."

"Go ahead and take it, Roach," Asher said bitterly. "It doesn't look like I'm going to have it any more."

"Uh-uh, don't you worry. You just haven't had it long enough to know how things go. Sganos's been after Lady Doc's job for years, he's got a toy-boy in the SocEngs, the dingo that clocked you, he uses for any excuse to crack heads. They've both run up a record, they had a pet Councillor they blackmailed to keep it quiet. But it was one crack too many when they picked on H-P 'cause Milord the Mayor used to be her lover when he was a law clerk, they would've made a match but he backed off in the end because she was sterile. He stayed sweet on her, I dunno why."

"My god!"

"It's just politics, man, nothin' but politics. The police knew everything even before I told them, and they haven't a thing on you — or the ladies. You'll be free tomorrow."

"And Sheleen?"

"If she keeps her head shut she's just a victim — and who else knows how to take care of her but the old lady?"

"Did Higgs-Partree know what was going on?"

"She'd have to. She's got esp as good as me, but she's too prissy to use it."

Asher swallowed this. "Ugh." He felt as if the ground had split like a thin skin beneath him and maggots and pus were boiling out of it.

Roach got up. "So you can see why I'd rather work in your outfit than muck around in all that shit."

"Yeh." Asher snorted and nearly choked on his own spit. "Did you take that ganja stash, Roach?"

Roach sniggered. "Gave it all to the police. Almost. Incidentally, my name ain't Roach, it's Ruiz, but you call me Captain SHAZAM! — with that point on it, 'cause that's who I am online."

Gradually, Higgs-Partree overcame her own terror, carefully found teachers and other guardians for Sheleen; eventually, allowed to slip one cage, she moved away from nurses and keepers to become a public voice and a silent self. She had control, new cage.



SHER SITS HERE ON THE SAME bench seven years later with a lingering sense of failure, wondering what he could have done, never having had a chance to do anything, never again touched by that feeling of being so alive.

Sometimes at night he dreams of swimming among stars, as fearlessly as if he were surrounded by whales and dolphins in a terrestrial sea, and wonders if he is sharing the dream, hope, wish of Sheleen or some other yearning sleeper. Other times he feels the blister burning on his lip. *What did I ever get from her? A sore face.* He has made matches with two women, neither lusted, and he's still looking for the one that will. *For Chrissake, Asher, I'd give you everything I have if I thought it was what you really wanted, but I don't know what you want, or if you want anything at all.*

He has not said ten words to Sheleen in the last three or four years until the day when SHAZAM! came up in his sidelong way, his usual look of being not quite ready to speak.

"Well, what is it, SHAZAM!"

"Ah ... there's a stalker."

He pulls himself away from those thoughts and casts the net of his searching mind over the City. He ought to be home sleeping, he's Director of Security, not a beat cop, and it's only one snivelling mind letting its filthy thoughts discharge, maybe a gormless wacko with a nightmare like the others that have been rounded up, given a trunk and a talk-to, sent home. But SHAZAM! has said *stalker* and there are no other choices for him now.

During the years the worst of the trolls have been flushed out and set to gathering grapes and husking corn, while the robots that were doing this are patrolling Underside — H-P's idea, a better-than-nothing bandage for a social sore. She's lying in the Cancer Hospital three streets away, having had a breast removed; one more wound. Sleeping fitfully, she folds her hands over the slowly healing crescent scar.

Gradually the SocEngs have been discredited and are no more than a shrivelled appendage of the police, and that's good, but there are still not quite enough of them or the police to pull out this wacko tonight.

Asher waits.

It is the twenty-fifth hour and nothing moves in the light of the pearl-drop lamps, no current of air disturbs the ivy winding the cenotaph. Asher remembers films he has seen in which there are night-birds calling and the chirps of crickets, but there is silence here except for the distant cry of a drunk with the d.t.s. The buildings are slab-sided and matte-surfaced, the sleepers whitewalled, helmeted or wrapped in blurred dreams. Asher knows there's something threatening out there, hears its whisper between the pulses of blood in his ears.

A moped skims toward him and in a moment someone sits beside him on the bench.

Of course it's Captain SHAZAM! the secret-sucker, who knows all and tells what he chooses. Immediately Asher hears the murmuring of the waking minds around him.

"You got something?"

SHAZAM! finds a slip of paper and rolls a joint.

"Something but I dunno where ..."

No police around here tonight, they're knocking on the sewer pipes and harassing the SexWorx. The too-sweet smoke makes Asher sneeze.

Suddenly, far away and coming nearer a high keening, whining mind-voice splits the inner ear:

get onto my mind you filthy shit bitch wheel.

"There he is, the same one. Christ, he just jumped out of nowhere!"

"Can you get any direction? Somebody's got to be looking at that guy somewhere, or esping him," Asher says.

"Most anybody going out without a helmet at night is drunk or sick —"

Another mind leaps out in anger:

what did I want or expect old woman? no one else to love dear God and no escape ever

"Shit, that's Sheleen taking off her helmet! Didn't you tell Haskell to track her home?"

"I told him and he did, but that don't mean she couldn't go out again! He isn't paid to watch her all night!"

Asher twists his head to look up at her dark window.

"She's gotta be somepl —"

come out and show your goddam sour face you sonofabitch damned bloody gutless —

"That's her awright, she somewhere near —"

spend life sneaking scared NEVER walk (out into air and wind) down any ordinary street mind my own business DRESS UP in all that MUCK like some BITTY KIDDIES DOLLY! NOTHING AROUND HERE BUT WALLS GOD DAMMIT AND MORE WALLS! sing sweet songs SHIT! Jeez Asher if only —

"Eh, round the corner Library Street — where she headed?"

"The tower," Asher whispers. "She's the one who goes home." Jeez Asher if only — Only what? But she didn't know what herself.

"Let's go!"

And then —

GRLEY GRLEY COMING TO GET YOU HUN RUN RUN BUT I WON'T LET YOU SHAZAM! gives a fearful start.

"What?"

"That's not the same one," SHAZAM! whispers. *There's gonna be more of them, y'know,* he had said. He pinches the ember off the joint and shoves the stub in his pocket. "That's a real nutter, he dunno she can't esp him."

They share the frozen feeling. It doesn't take many nutters to spark another sweep of the Great Dread that sends the fearful wackel ones screaming into the streets to kill each other out of sheer terror.

BUSHEL OF WHEAT, BUSHEL OF CLOVER

ALL NOT HID CAN'T HIDE OVER!

SHAZAM!'s on the moped now. Asher in back, says, "I'll tell the cops to stand by."

"They won't know where to find 'm if we don't."

"And they can't pull him in for thinking bad thoughts either."

"He's got a police stunner, finger on the trigger."

"They can pull him, that case." He taps his comm, whispers and listens. "Eh, there's a fire in the SexWorx, somebody killed, half the force Underside, shit, can't you make this thing go faster?"

Library Street, buildings cast shadows, windows black, nobody here but two men wearing helmets, smoking joints. Asher leans out to call, "Sheleen, Sheleen for God's sake where are you?"

"She ain't deaf, man!" one of the smokers calls back. A puff of his smoke winds into the branches of the potted trees.

"Lost her, dunno what."

"Maybe put her helmet on."

"Maybe. Not in that mood."

what did you save me for anyway old woman? just to have a daughter? for an ornament like icing on bread? to show off one of your damned experiments?

crawling crawling filthy pieces of flesh

"First one again, it's a crazy who doesn't know enough to put on a helmet."

"Still could be a killer."

"Eh," SHAZAM! stops the moped and scans the silence. "She's on Chapel Row," whispering, "heading for Odler, no other way to go," aims the moped past the baroque Mosque and the cubic Yeshiva, swinging around the gothic-style Seminary, pausing at Odler —

"Sheleen!" Asher calls again, into the echoes. "She must be running — or else she's using those fuzzy thoughts to keep us from knowing ... the way she used to when ..."

"She don't know we're out after her."

"refreshed air" it's fucking POISON wonder babies (used to call them bobbies huh) don't CHOKE on it bet there's suits you could put on and go outside with somewhere bet those big ugly rock splitters could build — oh satellite explorers ships you could OH

"HELLO SWEETHEART! DON'T YOU REMEMBER ME?"

Gravel-crusher voice, it's the rhymin' stallion: through the sparkles of his closed eyes Asher can sense the two of them in confrontation under the street lamp between the huddled green arch of the forest and the buttress-wings of St Polycarp Chapel.

Sheleen answers in a perfectly calm normal voice: "I never saw you in my life."

"YOU DON'T HAVE TO BOTHER LIVING TO ME —"

She's watching that face: *big popping eyes like thyroid in old medical histories* —

"— AND DON'T YOU INSULT MY EYES! DON'T YOU! DON'T YOU!"

"Maybe distract him," SHAZAM! says, skimming quietly down Older past Founders Alley toward Farbenstrasse, quietly but not quite fast enough.

Finger on the trigger, Asher's thinking. "He gets a blink of us he'll shoot her, even I can see it — Christ, she just thinks he's one of those dodos that comes on to her in the clubs"

"Not any more, she don't," SHAZAM! mutters.

Frightened now, keeping her voice steady: "I'm sorry, I never intended to insult you."

"Trying hard to close down her mind."

"THEN WATCH IT!" —

Asher, with SHAZAM!'s mind amplifying his own, feels her there with Bugeyes pushing forward, his stunner right in her face, backing her up Farbenstrasse to where it changes into Forest Road. His hair's whitish and curly, his skin is even more fishbelly pale than that of all the other whites in the sunless City.

Bugeyes dances with the joy of his manic fury: "DON'T THINK YOU CAN WRAP ME UP IN THAT FUZZY FEELGOOD SHIT, IT DOESN'T WORK ON ME I'M FREE AS YOU CAN SEE ... AND YOU REMEMBER ME, DEAR, I'M THE ONE THAT LOCKED YOU AND UNLOCKED YOU —"

Back in that jail cell with the cage on her head: yes, she remembers him.

"NOW I'M GOING TO OPEN YOU UP AND SHUT YOU —"

Skimming the corner up Farbenstrasse SHAZAM! switches off his headlight and Asher snarls, "Faster, for Chrissake, move in!"

"I —"

And the other voice — "no! leave her to me! the bitch is mine!" vaults across the road from where a figure has been waiting hidden behind the vineyard fence, "always singing me love love love and I send all my love to you and you don't care you rotten filthy teasing bitch," jumping the fence and running forward now, a heavy sweaty man squealing rage —

Sheleen cries out with a jet of fear, "You damned fools, I can't even esp you!"

The minds are deadly still; she has said the worst thing. There never was hope for them.

Asher tries in vain to reach them, his will is stronger than his esp, and he cries aloud to SHAZAM! — "Call them, damn you!" — but SHAZAM! has caught the fear, he closes his mind and crouches paralyzed.

Asher can see them with his own eyes now, down the road at the last street lamp by the Eastern Gate of the forest, Sheleen's backed up against the standard with her hands out, Bugeyes pinning her there with his hand flat between her breasts (*boobs*) and the gun's muzzle pressing under the angle of her jaw as if it was taking her pulse, the fat man squealing and gesticulating, running forward in a stumbling gait —

The moped sputters to a stop, Asher pounds SHAZAM! on the shoulder and yells, "Damn you SHAZAM! what'n bloody hell's the matter with you!"

But SHAZAM! has drifted off to some place he'd rather be, and Asher jumps off the moped, gun in hand and begins to run.

If Bugeyes sees or hears this he gives no sign. He swings his arm

and fires one dart, the yearning fat man falls with a single cry, twitches for a moment and is still.

N SILENCE, THE WORLD COMES ALIVE with dreamers. It is as if all of Asher's own feelings of fear, despair and suffocation have joined those of everyone alive here in this night. The Earth that men and women have idealized in their minds for nearly three centuries as a refuge with its sunlit meadows, rivers and flowers, fresh wind and driving rain, falls like shattered glass and leaves only the sharp edges of anger, the limits of closing walls, pressing smothering bodies, minds raw and bitter with old gnawing grudges and trapped by telepathy into sharing them, wasted dreams of the new future when it is the old past they are caged in — Sleepers rise from their sweated beds, claw at the doors and cry out! *Let me out! Their fear radiates like a black mist. Higgs-Partrée twists in her bed, wakes up shivering, cries OH! and gasps for breath.*

Asher, trembling in his gut, wanting to throw up, pushes everything aside, rushes forward yelling "Stop! Stop!"

Once again Bugeyes swings his gun away from Sheleen to take aim, at Asher.

Asher's wrist tingles lightly and he ignores it. He's afraid to fire his short-barrelled stunner at this long range, he has only fired it twice in all his working years.

Bugeyes, aiming, yells, "YAAAA!"

Sheleen takes one deep breath, screams: "NO!" Then: *damn you to hell you're on fire your blood is boiling your brain is bursting your rotten guts explode — YOUR FILTHY HEARTS A CINDER! DAMN YOU BURN!*

She's trembling with rage, has put a lifetime of it in one instant. Her face is streaked red and white with it.

Asher, jolted, is surprised to see that Bugeyes is still whole. But her blast has stopped him in mid-yell, eyes gaping and arms flung out.

Sheleen shoves at him with all her strength, he stumbles, tries to catch himself, falls back, loses the gun —

Asher, with a free target, fires and fires. But the dart is only a tranquilizer, enough to calm a violent patient, that's all. One of them hits Bugeyes in an ankle, he can't stand up, but he scrambles for the gun on his knees, grabs —

Asher fires once more, but his arm is going dead and the gun drops from his hand: the dart he's taken is no tranquilizer. Numbness creeps, his teeth chatter and he falls to his knees

SHAZAM!'s here, jolted out of his trance, grabs the gun and shoots Bugeyes dead.

Everything is quiet for a moment: bodies lying still, Sheleen clinging to the street lamp, Asher moving feebly as the numbness slides down his right side, SHAZAM! kneeling beside him.

Then Asher hears the police sirens, senses Sheleen's dazed weeping, and realizes that he, SHAZAM! and Sheleen are no longer alone. The awakened sleepers are gathering around them. They have heard the sirens, felt the searing flames of the fire underground, shared all of Sheleen's fears. They gaze at the bodies and cry out.

Tangled in shreds of nightmare they are yelling, "Let us out! Get us out of here!" Sleepless old men and women, young ones with whim-

poring babies, late-waking divinity students in skullcap and fringes, turbans and chador, their minds are flickering with fire and terror and they reach for Sheleen as if she has the keys.

"She's got to say something!" Asher hisses. He's within arm's reach of Sheleen but he can't touch her. "They'll hurt her — and they won't let in the medevac." He tries to cry out but his voice is too weak. He is trapped in his own nightmare.

"Tell them, Sheleen!" SHAZAM! yells.

me ... Sheleen's shivering, trying to be calm. Her face is drawn, and suddenly she looks very frail. She blinks, shakes her head slightly, swallows, forces herself to let go of the lampost. Puts her palms to her face for a moment, it is like looking through red bars. *Me? for all those songs I sang that made you feel good for five minutes? For all you that let me lie in the garbage?* But she damps this thought hard, folds down her rage, tamps it, reaches into her pocket to take out the expensive helmet that Higgs-Partree gave her so long ago. She pulls it on her head and fastens the clasp, *sik*.

There is a sigh of indrawn breath among the watchers, and they strain their ears to listen.

"All you people," she begins, catches her breath and says more loudly, "no! All us people, we don't need to get out right now, there's nothing here to make us frightened this minute, tonight, is there? Nothing will hurt us here. The air is good. We can breathe it easily. There are beds, we can all sleep tonight. There is plenty of food, we will all have breakfast tomorrow. There is everything here for us to live safely for a thousand years. We don't need permission from Earth to do this, they have their own worries, troubles, fights."

Her voice is quiet, and it is only her voice, unmediated by telepathy. "What we need is to be able to get out of here so that we can do new things in new places. We can't do that by opening any door, and we damned well can't do it by killing each other the way these men have done." She watches the listeners carefully. No, they're not going to kill anyone.

Slowly as she speaks she unclips her helmet and pulls it off. "We have to build our way out of here, in satellites, unmanned explorers, and maybe real ships like the one we landed in. It would take a long time, and an awful lot of work, but wouldn't you be grateful to do it and feel free living here when it's your own future you're building? That's not so frightening really, is it?"

If she gives the listeners a glimpse of moving among stars and landing on worlds with strange horizons it is as calm and limpid as a reflection in a pool. "Don't you think all those huge machines we've got could do that, if we wanted it? Instead of making velvet jackets, sewing needles and fake flowers? Wouldn't the builders and founders have been stupid if they didn't make plans for that?"

SHAZAM! suddenly bursts out snarling in esp and voice: "LET'S GO KNOCK CITY COUNCIL'S TEAKETTLE AND FIND OUT WHERE THOSE PLANS ARE!" Then claps his hand over his mouth and pulls back.

"Plans?" Asher tries to move and winces. "When did you find —?" SHAZAM! gulps. "Dummed if I know! It just came out of my head like that!"

Sholen says quietly — and quickly, before the audience can stir, "Yes, why not ask City Council? That's what they exist for — serving us, don't you think? Tonight you can sleep and dream on this ..."

The police have come and they are carefully dispersing the gathering. "I think I'm going," Asher says faintly.

"No not! You got to stay awake, man!" But a shadow is falling over everything and he falls too.

SHER'S NOT SURE WHETHER HE'S dead, and briefly he wonders whether he's gone crazy like his father, or just into limbo, but if he has there's no help for it. Through the huge window he watches giant steel limbs thrashing and pumping until the dust flows around them and dims the brassy light of the sun. He sees them

become slow, clumsy, rusty, until they slump in their dust, dead.

He's afraid they will never come to life again, and flings his arms, kicks his legs, battling his way upward into consciousness.

Some voice — Asher will never know whose — says: HOW IN BLOODY HELL DID HE FIND OUT ABOUT THOSE PLANS?

"AN INTERESTING QUESTION," ASHER SAYS. ALIVE AFTER ALL, HE opens his eyes. He is in the Cancer Hospital, where he's never been except to visit Higgs-Partree. "If I'm alive that gun wasn't so dangerous."

"You've had the antidote," Sheleen says wretchedly. She's sitting beside the bed.

He notices tears on her face. "What are the tears for? I'm glad to be alive, and damned glad you are!"

Her mouth twitches, and with laughter. "I wanted to tell them to get off their backsides and all I could do was send them off bleating like sheep!"

"You're crying for that? You kept them from killing us all in their panic!"

She sniffs. "Think they're going to be jumping off into space any minute?"

"It took millions of years for Earth to do it. Maybe we'll be a bit quicker."

"And so many people have been killed! Nothing I do makes any difference."

"So many killed?" He tries to sit up, but everything goes black until he lies down again.

"That fat one, and one of those two, I don't remember which, threw a bomb into the SexWorx that killed three people —"

A bomb! So much for thinking the world is safe!

"— and whatever I do makes them worse! Just like Duckfoot!"

"That was never your fault, Sheleen!" he says quickly. "You didn't make those deaders anything. In a small barrel you can't afford many bad monkeys."

"Don't joke with me, Asher! It's terrible to think I could be the cause of death. All that stupid singing — take them where they want to go! I don't know where the hell they want to go to!"

"Then why don't you take them where you want to go? I'll follow. I love you, Sheleen." He can't help it, he had to say it sooner or later. In spite of everything. Now she's going to bite his head off ... at least she's wearing the helmet.

Her mouth goes twitchy again with some mix of emotions and she takes his hand, a finger at a time. He says, "You have helped, you know, lots of people — and you could run for City Council!"

She grins, first time Asher's caught her doing it. "I'd scare the hell out of them." Then whispers: "All those years — Jeez Asher, couldn't you have said ...?" He feels her pulses stirring and they stir his own.

"I was afraid — no. That's not all of it. I never knew I really loved you then, not quite. And I really was scared." And you're not that easy to love either, but you're still more alive than — yes, almost anybody else on this world.

She sighs, grips his hand for a moment, lets it go, says, "Let me think a bit, Asher. They'll be letting you out in a few days." Bites her lip. "I'll see you, soon."

He does not say, *Is that a proposal?*

He watches vid, usual old films with happy endings, a lot of news

reports about the fire-bombing, no mention of Sheleen, ha. He sleeps a bit, and wakes up to find SHAZAM! in the chair beside the bed. He's got a helmet on too. He opens his mouth to speak.

"You don't have to say anything," Asher says. "Whatever it was, you saved me."

"That ain't all of it. You ain't anywhere near it." He fidgets. "I was scared shitless." He gulps down whatever bitterness is in his mouth. "When I was a knock-kneed kid living Underside there was this dirty brat with the esp like hers, yeh, the one H-P always blubbers about, a real filthy shitmouth that ran off at everybody, bigger than me, punched me up all the time, I was real scared of him, I'd hide when I saw him coming. He got beat up by his crazy family, they didn't know what was doing with him. I didn't either. One day a bunch of trolls started kicking at him and I thought he had it coming. I didn't know they were gonna kill him." He shuts his mouth and sits gripping his knees.

"There were a lot of them, and a lot bigger than you, I bet," Asher says. "Yeh. But I could've got help somewhere."

Asher remembers his days and nights Underside. "I've been through that. Nobody would've come. I'd have been dead if you hadn't shot that nutter."

"Eh. But I'm still scared of her." He stands up. "And that Bug-yes, he had blood comin' out of his ears. I think he was near dead when I got him."

After he leaves Asher rubs his lip and does a lot of thinking.

Two days later he puts on his clothes and visits Higgs-Partree two floors up. She's wrapped in extra tubes and monitors from the heart attack she had during the night of terror. She's not ready to die yet, but still looks pinched and pale. "Don't stir her up," the nurse warns.

He sits down and takes her hand, it's his privilege after all the years. It's old and bony, but still grips fiercely.

"Are there really plazes?" he asks. She must know: *She's got esp as good as me but she's too priss to use it, SHAZAM!* said. *Who else would have known?*

She laces her fingers over the wound on her chest. "I'm sure there are, it would be obvious to plan ahead, though I don't know how your friend found out. People do seem to know about them, and one day some one will find them, and we'll start the whole thing all over again. I'm glad I don't know where they are!"

There is a flicker of joy in her mind just the same. "That damned wild woman, Asher, you think she's safe at last?"

"I think so. They can't jail her for singing love songs."

"Good ... she never really was the dangerous one, Asher. It's the one that can read your mind and you can't read his."

"We'll breed out the esp before that happens. You'll see."

"Not I, Asher," she smiles grimly. "Not I." She whispers, "One or two bad monkeys gone at least ..."

Asher startles. *Blood coming out of his ears*

Higgs-Partree flashes him one black glance with a lightning-flare in it.

The back of his neck tingles, he nods and stands. "Get well quickly, Doctor." Hollow words.

"Thank you, Asher. Just pass me my helmet over there before you go."

Next day Asher walks out of the Hospital and takes the jitney to the edge of town and the long narrow escalators. The doors to the tower have been removed and many young people visit it, they have created

a little shrine of green branches and ears of corn, and there are a half-score here playing twangy music and smoking flower-petal incense, innocent stuff. They don't notice Asher.



E STANDS WHERE SHELEEN HAD stood, watching the falling sun, the brightening stars, the great machines of blackened steel as they dig and rise, hunker and swing. As the sky darkens into evening they slow, shuddering, and stop — are stopped so that

their deep vibrations will not disturb sleepers. Asher watches them without fear, and has almost a twinge of nostalgia for that childish thrill of terror.

He goes home to eat supper and write his letter of resignation, and wipes it off the screen again as usual.

Then he puts on the hat he doesn't need, shoves his hands in his pockets and saunters around Malkem's ironworks down Odler Road and along Drent Street toward the Jazzerama.

There are lots of people, men and women, young and old, waiting on the pavements tonight, some of them smoking, one or two of them with a joint. Asher pays no attention; he knows the biggest marijuana plant in the world is still growing Underside, a century and a half old at least.

Inside the club is crammed, and he squeezes into a seat at the back. A hand sweeps aside the blue velvet curtain. Sheleen comes out and closes it behind her in one swift movement.

She's barefaced — no more goddam masks! — and she's found something dark and glittery to wear.

She bows, nods wisely at the audience, and begins to sing in a whispery voice:

*I want to pick a yellow stone and skim it in that sea of space ...
I want to reach out for a star and burn its kiss against my face
to swim the endless sea of space and find a stranger human race
to touch the farthest world and see a woman with a startling face
A kinder hand, a clearer eye, a whiter sun, a greener sky
I want to pick a yellow stone and skim it in that sea of space ...*

The listeners don't quite know what to make of this, they shift and rustle, wonder where it's all leading, it's not quite right ...

Sheleen grins ruefully and shakes her head. The sitar tingles into life and she sings:

*Love evolves like planets turning
ever to the baring sun —*

The audience sighs and sits back. Asher stands and begins to work his way down front, looking for a seat. Sheleen sees him and beckons: *Come!*

*Love's the crown of evolution!
nothing further to be won!
it's no sin, it's absolution!
passion burns from sun to sun!*

Asher's at the foot of the platform now and looks up. Sheleen holds out a fist toward him and for a moment he thinks she's about to give him the finger but at the last, the very last second she grins again, opens it like a branch of roses and he takes it gingerly, for fear of thorns. □

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Mankind has finally returned in triumph to the surface of the Moon. One problem remains, however: Which Moon is it anyway?

MOON SIX

BY STEPHEN BAXTER

Illustrated by Doug Andersen

BADO WAS ALONE ON THE PRIMEVAL beach of Cape Canaveral, in his white lunar-surface pressure suit, holding his box of Moon rocks and sampling tools in his gloved hand. He lifted up his gold sun visor and looked around. The sand was hard and flat. A little way inland,

there was a row of scrub pines, maybe ten feet tall.

There were no ICBM launch complexes here.

There was no Kennedy Space Center, in fact: no space program, evidently, save for him. He was stranded on this empty, desolate beach.

As the light leaked out of the sky, an unfamiliar Moon was brightening.

Bado glared at it. "Moon Six," he said. "Oh, shit."

He took off his helmet and gloves. He picked up his box of tools and began to walk inland. His blue over-shoes, still stained dark gray from lunar dust, left crisp

Moonwalk footprints in the damp sand of the beach.

Bado drops down the last three feet of the ladder and lands on the foil-covered footpad. A little gray dust splashes up around his feet.

Slade is waiting with his camera. "OK, turn around and give me a big smile. Atta boy. You look great. Welcome to the Moon." Bado can't see Slade's face, behind his reflective golden sun visor.



Bado holds onto the ladder with his right hand and places his left foot on the Moon. Then he steps off with his right foot, and lets go of the LM. And there he is, standing on the Moon.

The suit around him is a warm, comforting bubble. He hears the hum of pumps and fans in the PLSS—his backpack, the Portable Life Support System—and feels the soft breeze of oxygen against his face.

He takes a halting step forward. The dust seems to crunch beneath his feet, like a covering of snow. There is a firm footing beneath a soft, resilient layer a few inches thick. His footprints are miraculously sharp, as if he's placed his ridged overshoes in fine, damp sand. He takes a photograph of one particularly well-defined print; it will persist here for millions of years, he realizes, like the fossilized footprint of a dinosaur, to be eroded away only by the slow rain of micrometeorites, that echo of the titanic bombardments of the deep past.

He looks around.

The LM is standing in a broad, shallow crater. Low hills shoulder above the close horizon. There are craters everywhere, ranging from several yards to a thumbnail width, the low sunlight deepening their shadows.

They call the landing site Taylor Crater, after that district of El Lago—close to the Manned Spacecraft Center in Houston—where he and Fay have made their home. This pond of frozen lava is a relatively smooth, flat surface in a valley once flooded by molten rock. Their main objective for the flight is another crater a few hundred yards to the west that they've named after Slade's home district of Wildwood. Surveyor 7, an unmanned robot probe, set down in Wildwood a few years before; the astronauts are here to sample it.

This landing site is close to Tycho, the fresh, bright crater in the Moon's southern highlands. As a kid Bado had sharp vision. He was able to see Tycho with his naked eyes, a bright pinprick on that ash-white surface, with rays that spread right across the face of the full Moon.

Now he is here.

Bado turns and bounces back toward the LM.

AFTER A FEW MILES HE GOT TO A SMALL TOWN.

He hid his lunar pressure suit in a ditch, and, dressed in his tube-covered cooling garment, snuck into someone's backyard. He stole a pair of jeans and a skirt he found hanging on the line there. He hated hunting to steal; he didn't plan on having to do it again.

He found a small bar. He walked straight in and asked for a job. He knew he couldn't afford to hesitate, to hang around figuring what kind of work he'd finished up in. He had no money at all, but right now he was clean-shaven and presentable. A few days of sleeping rough would leave him too dirty and stinking to be employable.

He got a job washing glasses and cleaning out the john. That first night he slept on a park bench, but bought himself breakfast and cleaned himself up in a gas station john.

After a week, he had a little money saved. He loaded his lunar gear into an old trunk, and hitched to Daytona Beach, a few miles up the coast.

THEY CLIMB EASILY OUT OF TAYLOR.

Their first Moonwalk is a misshapen circle that will take them around several craters. The craters are like drill holes, the geologists say, excavations into lunar history.

The first stop is the north rim of a 100-yard-wide crater they call Huckleberry Finn. It is about 300 yards west of the LM.

Bado puts down the tool carrier. This is a handheld tray, with an assortment of gear: rock hammers, sample bags, core tubes. He leans over, and digs into the lunar surface with a shovel. When he scrapes away the gray upper soil he finds a lighter gray, just under the surface.

"Hey, Slade. Come look at this."

Slade comes floating over. "How about that. I think we found some ray material." Ray material here will be debris from the impact that formed Tycho.

Lunar geology has been shaped by the meteorite impacts that pounded its surface in prehistory. A main purpose of sending this

mission so far south is to keep them away from the massive impact that created the Mare Imbrium, in the northern hemisphere. Ray material unpolluted by Imbrium debris will let them date the more recent Tycho impact.

And here they have it, right at the start of their first Moonwalk.

Slade flips up his gold visor so Bado can see his face, and grins at him. "How about that. We are looking at a full-up mission here, boy."

They finish up quickly, and set off at a run to the next stop. Slade looks like a human-shaped beach ball, his suit brilliant white, bouncing over the beach-like surface of the Moon. He is whistling.

They are approaching the walls of Wildwood Crater. Bado is going slightly uphill, and he can feel it. The carrier, loaded up with rocks, is getting harder to carry too. He has to hold it up to his chest, to keep the rocks from bouncing out when he runs, and so he is constantly fighting the stiffness of his pressure suit.

"Hey, Bado," Slade says. He comes loping down the slope. He points. "Take a look."

Bado has, he realizes, reached the rim of Wildwood Crater. He is standing on top of its dome-like, eroded wall. And there, planted in the crater's center, is the Surveyor. It is less than 100 yards from him. It is a squat, three-legged form, like a broken-off piece of an LM.

Slade grins. "Does that look neat? We got it made, Bado," Bado claps his commander's shoulder. "Outstanding, man." He knows that for Slade, getting to the Surveyor, bringing home a few pieces of it, is the finish line for the mission.

Bado looks back east, the way they have come. He can see the big, shallow dip in the land that is Taylor, with the LM resting at its center like a toy in the palm of some huge hand. It is a glistening, filmy construct of gold leaf and aluminum, bristling with antennae, docking targets, and reaction control thruster assemblies.

Two sets of footsteps come climbing up out of Taylor toward them, like footsteps on a beach after a tide.

Bado tips back on his heels and looks at the sky.

The sky is black, empty of stars; his pupils are closed up by the dazzle of the sun, and the reflection of the pale brown lunar surface. But he can see the Earth, a fat crescent, four times the size of a full Moon. And there, crossing the Zenith, is a single, brilliant, uninking star: the orbiting Apollo CSM, with Al Pond, their command module pilot, waiting to take them home.

There is a kind of shimmer, like a heat haze. And the star goes out.

Just like that—it vanishes from the sky, directly over Bado's head. He blinks, and moves his head, stiffly, thinking he might have just lost the Apollo in the glare.

But it is gone.

What, then? Can it have moved into the shadow of the Moon? But a little thought knocks out that one; the geometry, of sun and Moon and spacecraft, is all wrong.

And anyhow, what was that heat haze shimmer? You don't get heat haze where there's no air.

He lowers his head. "Hey, Slade. You see that?"

But Slade isn't anywhere to be seen, either; the slope where he's been standing is smooth, empty.

Bado feels his heart hammer.

He lets go of the tool carrier—it drifts down to the dust, spilling rocks—and he lopes forward. "Come on, Slade. Where the hell are you?"

Slade is famous for "gotchas"; he is planning a few that Bado knows about, and probably some he doesn't, for later in the mission. But it is hard to see how he's pulled this one off. There is nowhere to hide, damn it.

He gets to where he thinks Slade was last standing. There is no sign of him. And there aren't even any footsteps, he realizes now. The only marks under his feet are those made by his own boots, leading off a few yards away, to the north.

And they start out of nothing, it seems, like Man Friday steps in the crisp virgin Moon-snow. As if he's stepped out of nowhere onto the regolith.

When he looks back to the east, he can't see the LM either.

"Slade, this isn't funny, damn it." He starts to bound, hastily, back

in the direction of the LM. His clumsy steps send up parabolic sprays of dust over unmarked regolith.

He feels his breath getting shallow. It isn't a good idea to panic. He tells himself that maybe the LM is hidden behind some low ridge. Distances are deceptive here, in this airless sharpness.

"Houston, Bado. I got some kind of situation here." There isn't a reply immediately; he imagines his radio signal crawling across the light-seconds' gulf to Earth. "I'm out of contact with Slade. Maybe he's fallen somewhere, out of sight. And I don't seem to be able to see the LM. And ...

"And someone's wiped over our footsteps, while I wasn't looking." Nobody is replying, he realizes.

That stops him short. Dust falls over his feet. On the surface of the Moon, nothing is moving.

He looks up at the crescent Earth. "Ah, Houston, this is Bado. Houston. John, come in, captain."

Just silence, static in his headset.

He starts moving to the east again, breathing hard, the sweat pooling at his neck.

HE RENTED AN APARTMENT.

He got himself a better job in a radio store. In the Air Force, before joining NASA, he'd specialized in electronics. He'd been apprehensive that he might not be able to find his way around the gear here, but he found it simple — almost crude, compared to what he'd been used to. They had transistors here, but they still used big chunky valves and paper capacitors. It was like being back in the early '50s. Radios were popular, but there were few TVs: small black and white gadgets, the reception lousy.

He began watching the TV news and reading the newspapers, trying to figure out what kind of world he'd been dropped in.

The weather forecasts were lousy.

And foreign news reports, even on the TV, were sent by wire, like they'd been when he was a kid, and were often a day or two out of date.

The Vietnam War was unfolding. But there'd been none of the protests against the war here like he'd seen back at home. There were no live TV pictures, no color satellite images of soldiers in the mud and the rain, napalming civilians. Nobody knew what was happening out there. The reaction to the war was more like what he remembered of World War II.

There really was no space program. Not just the manned stuff had gone: There were no weather satellites, communication satellites. Sputnik, Explorer, and all the rest just hadn't happened. The Moon was just a light in the sky that nobody cared about, like when he was a kid. It was brighter, though, because of that big patch of highland where Inebrium should have been.

On the other hand, there were no ICBMs, as far as he could tell.

HIS MOUTH IS BONE-DRY FROM THE PURE OXYGEN. HE IS BREATHING HARD; he hears the hiss of water through the suit's cooling system, the pipes that curl around his limbs and chest.

There is a rational explanation for this. There has to be. Like, if he's got out of line of sight with the LM, somehow, he's invisible to the LM's radio relay, the Lunar Communications Relay Unit. He is linked to that by VHF, and then by S-band to the Earth.

Yeah, that has to be it. As soon as he gets back in line of sight of the LM, he can get in touch with home. And maybe with Slade.

But he can't figure how he could have gotten out of the LM's line of sight in the first place. And what about the vanished footsteps?

He tries not to think about it. He just concentrates on loping forward, back to the LM.

In a few minutes, he is back in Taylor Crater.

There is no LM. The regolith here is undisturbed.

Bado bounces across the virgin surface, scuffing it up.

Can he be in the wrong place? The lunar surface does have a tendency to look the same everywhere ... Hell, no. He can see he is right in the middle of Taylor; he recognizes the shapes of the hills. There can't be any doubt.

What, the n? Can Slade have somehow gotten back to the LM, taken off without him?

But how can Bado not have seen him, seen the boxy LM ascent stage lift up into the sky? And besides, the regolith would be marked by the ascent stage's blast.

And, he realizes dimly, there would, of course, be an abandoned descent platform here, and bits of it. And their footsteps. His thoughts are sluggish, his realization coming slowly. Symptoms of shock, maybe.

The fact is that save for his own footfalls, the regolith is as unmarked as if he's been dropped out of the sky.

And meanwhile, nobody in Houston is talking to him.

He is ashamed to find he is crying, mumbling, tears rolling down his face inside his helmet.

He starts to walk back west again. Following his own footsteps — the single line he made coming back to find the LM — he works his way out of Taylor, and back to the rim of Wildwood.

Hell, he doesn't have any other place to go.

As he walks he keeps calling, for Slade, for Houston, but there is only static. He knows his signal can't reach Earth anyway, not without the LM's big S-band booster.

At Wildwood's rim there is nothing but the footfalls he left earlier. He looks down into Wildwood, and there sits the Surveyor, glistening like some aluminum toy, unperturbed.

He finds his dropped carrier, with the spilled tools and bagged rocks. He bends sideways and scoops up the stuff, loading it back into the carrier.

Bado walks down into Wildwood, spraying lunar dust ahead of him.

He examines the Surveyor. Its solar cell array is stuck out on a boom above him, maybe ten feet over the regolith. The craft

bristles with fuel tanks, batteries, antennae, and sensors. He can see the craft's mechanical claw where it has scraped into the lunar regolith. And he can see how the craft's white paint has turned tan, maybe from exposure to the sunlight. There are splashes of dust under the vernier rocket nozzles; the Surveyor is designed to land hard, and the three pads have left a firm imprint in the surface.

He gets hold of a landing leg and shakes the Surveyor "OK," he calls up. "I'm jiggling it. It's planted here." There was a fear that the Surveyor might tip over onto the astronauts when they try to work with it. That evidently isn't going to happen. Bado takes a pair of cutting shears from his carrier, gets hold of the Surveyor's TV camera, and starts to chop through the camera's support struts and cables. "Just a couple more tubes," he says. "Then that baby's mine."

He'll finish up his Moonwalk, he figures, according to the time line in the spiral-bound checklist on his cuff. He'll keep on reporting his observations, in case anyone is listening. And then ... when he gets to the end of the walk, he'll figure out what to do next. Later there will be another boundary, when his PLSS's consumables expire. He'll deal with those things when they come. For now, he is going to work.

*It will
persist here
for millions
of years,
he realizes,
like the
fossilized
footprint of a
dinosaur.*

The camera comes loose, and he grips it in his gloves. "Got it! It's ours!"

He drops the camera in his carrier, breathing hard. His mouth is dry as sand; he'd give an awful lot for an ice-cool glass of water, right here and now.

There is a shimmer, like heat haze, crossing between him and the Surveyor. Just like before.

He tilts back and looks up. There is old Earth, the fat crescent. And a star, bright and unwavering, is crossing the black sky, directly over his head.

It has to be the Apollo CSM.

He drops the carrier to the dirt and starts jumping up and down, in great big lunar hops, and he waves, as if he is trying to attract a passing aircraft. "Hey, Al! Al! Pond! Can you hear me?" Even without the LM, Pond, in the CSM, might be able to pick him up.

His mood changes to something resembling elation. He doesn't know where the hell Apollo has been, but if it is back, maybe soon so will be the LM, and Slade, and everything. That will suit Bado, right down to the lunar ground he is standing on. He'll be content to have it all back the way it had been, the way it is supposed to be, and figure out what has happened to him later.

"Al! It's me, Bado! Can you hear me? Can you ..."

There is something wrong.

That light isn't staying steady. It is getting brighter, and it is drifting off its straight line, coming down over his head.

It isn't the CSM in orbit. It is some kind of boxy craft, much smaller than an LM, descending toward him, gleaming in the sunlight.

He picks up his carrier and holds it close to his chest, and stays close to the Surveyor. As the craft approaches he feels an unreasoning fear.

His kidneys send him a stab of distress. He stands still and lets go, into the urine collection condom. He feels shamed; it is like wetting his pants.

The craft is just a box, on four spindly landing legs. It is coming down vertically, standing on a central rocket. He can see no light from the rocket, of course, but he can see how the downward blast is starting to lick up some dust. It is going to land maybe fifty yards from the Surveyor, right in the middle of Wildwood Crater. The whole thing is made of some silvery metal, maybe aluminum. It has a little control panel, set at the front, and there is someone at the controls. It looks like a man — an astronaut, in fact — his face hidden behind a gold-tinted visor.

Bado can see the blue of a NASA logo, and a dust-coated stars and stripes, pointed on the side of the craft.

Maybe fifty feet above the ground the rocket cuts out, and the craft begins to drop. The sprays of dust settle back neatly to the lunar soil. Now little vernier rockets, stuck to the side of the open compartment, cut in to slow the fall, kicking up their own little sprays.

It is all happening in complete silence.

The craft hits the ground with a solid thump. Bado can see the pilot, the astronaut, flick a few switches, and then turn and jump the couple of feet down off the little platform to the ground.

The astronaut comes giraffe-ling across the sunlit surface toward Bado and stops a few feet from him, and stands there, slightly stooped forward, balancing the weight of his PLSS.

His suit looks pretty much like a standard EMU, an Apollo Extravehicular Mobility Unit. There is the usual gleaming white over-

*There is
a kind of
shimmer, like
a heat haze.
And the star
goes out. Just
like that,
it vanishes
from the sky.*

suit — the thermal micrometeorite garment — with the lower legs and overshoes scuffed and stained with Tycho dust. Bado can see the PLSS oxygen and water inlets on the chest cover, and penlight and utility pockets on arms and legs. And there is Old Glory stitched to the left arm.

But Bado doesn't recognize the name stitched over the breast. Williams. There is no astronaut of that name in the corps back in Houston.

Bado's headset crackles to life, startling him.

"I heard you, when the LFU came over the horizon. As soon as I got in line of sight, I could hear you talking, describing what you were doing. And when I looked down, there you were."

Bado is astonished. It is a woman's voice. This Williams is a goddess woman.

Bado can't think of a thing to say.

HE DIDN'T FIND IT HARD TO FIND A PLACE IN the community here and to fabricate a fake ID about his past. Computers were pretty primitive, and there was little cross-checking of records.

Maybe, back home, the development of computers had been forced by the Apollo project, he speculated.

He couldn't see any way he was going to get home. He was stuck here. But he sure as hell didn't want to spend his life twining crumpled 1960s-design radios.

He tinkered with the Surveyor camera he'd retrieved from the Moon. As far as he could tell, it was a much more lightweight design than anything available here. But the manufacturing techniques required weren't much beyond what was available here.

He started to take the camera components to electronic engineering companies. He took apart his lunar suit. In all this world there was nothing like the suit's miniaturized telemetry system. He was able to adapt it to be used to transmit EKG data from ambulances to hospital emergency rooms. He sent samples of the Ecto-cloth outer coverall to a fiberglass company, and shaved them how the stuff could be used for fire hoses. Other samples went to military suppliers to help them put together better insulated blankets. The scratch-proof lens of the Surveyor camera went to an optical company to manufacture better safety goggles and other gear. The miniature, high-performance motors driving the pumps and fans of his PLSS found a dozen applications.

He was careful to patent everything he 'developed' from his lunar equipment.

Pretty soon, the money started rolling in.

"MAYBE I'M DREAMING THIS," WILLIAMS SAYS. "DEHYDRATION, OR SOMETHING ... Uh, I guess I'm pleased to meet you."

She has a Tennessee accent, he thinks.

Bado shakes the hand. He can feel it through his own stiff pressure glove. "I guess you're too solid for a ghost."

"Ditto," she says. "Besides, I've never met a ghost yet who uses VHF frequencies."

He releases her hand.

"I don't know how the hell you got here," she says. "And I guess you don't understand this any better than I do."

"That's for sure."

She dips her visored head. "What are you doing here, anyway?" He holds up the carrier. "Sampling the Surveyor. I took off its TV camera."

"Oh. You couldn't get it, though."

"Sure. Here it is."

She turns to the Surveyor. "Look over there."

The Surveyor is whole again, its TV camera firmly mounted to its struts.

But when he looks down at his carrier, there is the TV camera he's cut away, lying there, decapitated.

"Where's your LM?" she asks.

"Taylor Crater."

"Where?"

He describes the crater's location.

"Oh. OK. We're calling that one San Jacinto. Ah, no, your LM isn't there."

"I know. I walked back. The crater's empty."

"No, it isn't," she says, but there is a trace of alarm in her voice.

"That's where my LM is. With my partner, and the Payload Module. Payload Module?"

"The hell with it," she says. "Let's go see."

She turns and starts to lope back to her flying craft, rocking from side to side. He stands there and watches her go.

After a few steps she stops and turns around. "You want a lift?"

"Can you take two?"

"Sure. Come on. What choice do you have, if you're stuck here without an LM?"

Her voice carries a streak of common sense that somehow comforts him.

Side by side, they bound over the Moon.

They reach Williams' flying machine. It is just an aluminum box sitting squat on its four legs, with vernier rocket nozzles stuck to the walls like clusters of berries. The pilot has to climb in at the back and stand over the cover of the main rocket engine, which is about the size of a car engine, Bado supposes. Big spherical propellant and oxidizer tanks are fixed to the floor. There is an S-band antenna and a VHF aerial. There is some gear on the floor, hammers and shovels and sample bags and cameras; Williams dumps this stuff out, briskly, onto the regolith. She hops up onto the platform and begins throwing switches. Her control panel contains a few instruments, a CRT, a couple of handsets.

Bado lugs his heavy tool carrier up onto the platform, then he gets hold of a rail with both hands and jumps up.

"What did you call this thing? An LFU?"

"Yeah. Lunar Flying Unit."

"I've got vague memories," says Bado, "of a design like this. It was never developed, when the extended Apollo missions were canceled."

"Canceled? When did that happen?"

"When we were cut back to stop when we got to Apollo 17."

"Uh huh," she says dubiously. She eyes the tool carrier. "You want to bring that thing?"

"Sure. It's not too heavy, is it?"

"No. But what do you want it for?"

Bado looks at the battered, dusty carrier, with its meaningless load of rocks. "It's all I've got."

"OK. Let's get out of here," she says briskly.

Williams kicks in the main rocket. Dust billows silently up off the ground into Bado's face. He can see frozen vapor puff out of the attitude nozzles, in streams of shimmering crystals, as if this is some unlikely steam engine, a Victorian engineer's fantasy of lunar flight.

The basin of Wildwood Crater falls away. The lift is a brief, comforting surge.

Williams whoops. "Whee-hoo! What a ride, huh, pal?" She takes the LFU up to maybe sixty feet, and slows the ascent. She pitches the craft over and they begin sailing out of Wildwood.

The principles of the strange craft are obvious enough to Bado. You stand on your rocket's tail. You keep yourself stable with the four peroxide reaction clusters, the little vernier rockets spaced around the frame, squirting them here and there. When the thrust of the single big downward rocket is at an angle to the vertical, the LFU goes shooting forward, or sideways, or backward across the pitted surface. Williams shows him the hand controls. They are just

like the LM's. The attitude control moves in clicks; every time Williams turns the control the reaction rockets will bang and the LFU will tip over, a degree at a time. The thrust control is a toggle switch; when Williams closes it the lift rockets roar, to give her a delta-vee of a foot per second.

"These are neat little craft," Williams says. "They fly on residual descent-stage propellants. They've a range of a few miles, and you can do three sorties in each of them."

"Each?"

"We bring two. Rescue capability."

Bado thinks he is starting to see a pattern to what has happened to him.

In a way, the presence of the camera in his carrier is reassuring. It means he isn't crazy. There really have been two copies of the Surveyor, one of which he's sampled, and one he hasn't.

Maybe there is more than one goddamn Moon.

Moon One is the good old lantern in the sky that he and Slade touched down on yesterday. Maybe Slade is still back there, with the LM. But Bado sure isn't. Somehow he stumbled onto Moon Two, the place with the Surveyor, but no LM. And then this Williams showed up, and evidently by that time he was on another Moon, Moon Three, with its own copy of the Surveyor. And a different set of astronauts exploring, with subtly different equipment.

As if traveling to one Moon isn't enough.

He thinks about that strange, heat-laze shimmer. Maybe that has something to do with these weird transfers.

He can't discuss any of this with Williams, because she hasn't seen any of the changes. Not yet, anyhow.

Bado clings to the sides of the LFU and watches the surface of the Moon scroll underneath him. There are craters everywhere, overlaid circles of all sizes, some barely visible in a surface gardened by billions of years of micrometeorite impact. The surface looks ghostly, rendered in black and white, too stark, unmoving, to be real.

HE KNEW HE WAS TAKING A RISK, BUT HE TOOK HIS LUNAR ROCKS TO A COUPLE OF UNIVERSITIES.

He got laughed out of court. Especially when he wouldn't explain how these charcoal-dark rocks might have got from the Moon to the Earth.

"Maybe they got blasted off by a meteorite strike," he said to an 'expert' at Cornell. "Maybe they drifted in space until they landed here. I've read about that."

The guy pushed his reading glasses further up his thin nose. "Well, that's possible." He smiled. "No doubt you've been reading the same lurid speculation I have, in the popular science press. What if rocks get knocked back and forth between the planets? Perhaps there are indeed bits of the Moon, even Mars, to be turned up, here on Earth. And, since we know living things can survive in the interiors of rocks — and since we know that some plants and bacteria can survive long periods of dormancy — perhaps it is even possible for life to propagate itself, across the trackless void, in such a manner."

He picked up Bado's Moon rock, dubiously. "But in that case I'd expect to see some evidence of the entry of this rock into the atmosphere. Melting, some glass. And besides, this rock is not volcanic. Mr. Bado, everyone knows the Moon's major features were formed exclusively by volcanism. This can't possibly be a rock from the Moon."

Bado snatched back his rock. "That's Colonel Bado," he said. He marched out.

He gave up, and went back to Daytona Beach.

THE LFU SLIDES OVER THE RIM OF TAYLOR CRATER. OR SAN JACINTO. Bado can see scuffed-up soil below him, and the big Hackberry Finn Crater to his left, where he and Slade made their first stop.

At the center of Taylor stands an LM. It glitters like some piece of giant jewelry, the most colorful object on the lunar surface. An astronaut bounces around in front of it, like a white balloon. He — or she — is working at what looks like a surface experiment pack-

age, white-painted boxes and cylinders and masts laid out in a star formation and connected to a central nuclear generator by orange cables. It looks like an ALSEP, but it is evidently heavier, more advanced.

But the LM isn't alone. A second LM stands beside it, squat and spidery. Bado can see that the ascent stage has been heavily reworked; the pressurized cabin looks to be missing, replaced by cargo pallets.

"That's your Payload Module, right?"

"Yeah," Williams says. "The Lunar Payload Module Laboratory. It got here on automatics before we left the Cape. This is a dual Saturn launch mission, Bado. We've got a stay time of four weeks."

Again he has vague memories of proposals for such things: dual launches; well-equipped, long-stay jaunts on the surface. But the funding squeezes since '66 have long since put pay to all of that. Evidently, whenever Williams comes from, the money is flowing a little more freely.

The LFU tips itself back, to slow its forward velocity. Williams throbs the main motor and the LFU starts to drop down. Bado glances at the numbers; the CRT display evolves smoothly through height and velocity readings. Bado guesses the LFU must have some simple radar-based altimeter.

Now the LM and its mishapen partner are obscured by the dust Williams' rocket is kicking up.

At fifty feet Williams cuts the main engine. Bado feels the drop in the pit of his stomach, and he watches the ground explode toward him, resolving into unwelcome detail, sharp boulders and zap pits and footprints, highlighted by the low morning sun.

Then venier dust clouds billow up around the LFU. Bado feels a comforting surge of deceleration.

The LFU lurches with a jar that Bado feels in his knees.

For a couple of seconds the dust of their landing cloaks the LFU, and then it begins to settle out around them, coating the LFU's surfaces, his suit.

There is a heat-haze shimmer. "Oh, shit."

Williams is busily shutting down the LFU. She turns to face him, anonymous behind her visor.

THERE WASN'T MUCH ASTRONOMY GOING ON AT ALL, IN FACT, HE found out when he looked it up in the libraries. Just a handful of big telescopes, scattered around the world, with a few cruddy old guys following their obscure, decades-long projects. And all the projects were to do with deep space: the stars and beyond. Nobody was interested in the Solar System. Certainly in nothing as mundane as the Moon.

He looked up at Moon Six, uneasily, with its bright, unscarred north-west quadrant. If that Imbrium meteorite had hit three billion years ago — or in 1970 — where the hell was it now?

Maybe that big mother was on its way, right now.

Quietly, he pumped some of his money into funding a little research at the universities into Earth-neighborhood asteroids.

He also siphoned money into trying to figure out what had happened to him. How he got here.

AS THE LAST DUST SETTLES, BADO LOOKS TOWARD THE CENTER OF TAYLOR Crater, to where the twin LMs stood.

He can make out a blocky shape there.

He feels a sharp surge of relief. Thank God. Maybe this transition hasn't been as severe as some of the others. Or maybe there hasn't been a transition at all...

But Williams' LM has gone, with its cargo-carrying partner. And so has the astronaut, with his surface package. But the crater isn't empty. The vehicle that stands in its place has the same basic geometry as an LM. Bado thinks, with a boxy descent stage standing on four legs, and a fat ascent stage cabin on top. But it is just fifteen feet tall — compared to an LM's twenty feet — and the cabin looks a lot smaller.

"My God," Williams says. She is just standing, stock still, staring at the little lander.

"Welcome to Moon Four," Bado whispers.

"My God." She repeats that over and over.

He faces her, and flips up his gold visor so she can see his face. "Listen to me. You're not going crazy. We've been through some kind of — transition. I can't explain it." He grins. It makes him feel stronger to think there is someone else more scared, more shocked, than he is.

He takes her through his tentative theory of the multiple Moons.

She turns to face the squat lander again. "I figured it had to be something like that."

He gazes at her. "You figured?"

"How the hell else could you have got here? Well, what are we supposed to do now?" She checks the time on her big Rolex watch.

"Bado. How long will your PLSS hold out?"

He feels embarrassed. Shocked or not, she's cut to the chase a lot more smartly than he's been able to. He glances at his own watch, on the cuff next to his useless checklist. "A couple of hours. What about you?"

"Less, probably. Come on." She glides down from the platform of the LFU, her blue boots kicking up a spray of dust.

"Where are we going?"

"Over to that little LM, of course. Where else? It's the only source of consumables I can see anywhere around here." She begins loping toward the lander.

After a moment, he picks up his carrier, and follows her.

As they approach, he gets a better look at the lander. The ascent stage is a bulbous, mishapen ball, capped by a fat, wide disk that looks like a docking device. Two dinner-plate-sized omnidirectional antennae are stuck out on extensible arms from the descent stage. The whole clumsy-looking assemblage is swathed in some kind of green blanket, maybe for thermal insulation.

A ladder leads from a round hatch in the front of the craft, and down to the surface via a landing leg. The ground there is scuffed with footprints.

"It's a hell of a small cabin," she says. "Has to be one man."

"You think it's American?"

"Not from any America I know. That ascent stage looks familiar. It looks like an adapted Soyuz orbital module. You know, the Russian craft, their Apollo equivalent."

"Russian?"

"Can you see any kind of docking tunnel on top of that thing?"

He looks. "Nope. Just that flat assemblage at the top."

"The crew must have to spacewalk to cross from the command module. What a design."

An astronaut comes loping around the side of the lander, swaying from side to side, kicking up dust. When he catches sight of Bado and Williams, he stops dead.

The stranger is carrying a flag, on a pole. The flag is stiffened with wire, and it is clearly bright red, with a gold hammer and sickle embroidered into it.

"How about that," Williams whispers. "I guess we don't always get to win, huh."

The stranger — the cosmonaut, Bado labels him — takes a couple of steps toward them. He starts gesticulating, waving his arms about, making the flag flutter. He wears a kind of hoop around his waist, held away from his body with stiff wire.

"I think he's trying to talk to us," Williams says.

"It'll be a miracle if we are on the same frequency. Maybe he's S-band only, to talk to Earth. No VHF. Look how stiff his movements are."

"Yeah, I think his suit is semi-rigid. Must be hell to move around in."

"What's with the hoodoo?" Bado asks.

"It will stop him falling over, in case he trips. Don't you get it? He's on his own here. That's a one-man lander. There's nobody around to help him, if he gets into trouble."

The cosmonaut is getting agitated. Now he hoists up the flag and throws it at them, javelin-style; it falls well short of Bado's feet. Then the cosmonaut turns and lopes toward his lander, evidently looking for more tools, or improvised weapons.

"Look at that," Bado says. "There are big funky hinges down the

side of his backpack. That must be the way into the suit."

Williams lifts up her visor. "Show him your face. We've got to find some way to get through to this guy."

Bado feels like laughing. "What for?"

The light changes.

Bado stands stock still. "Shit, not again."

Williams says, "What?"

"Another transition." He looks around for the tell-tale heat-haze flicker.

"I don't think so," Williams says softly. "Not this time."

A shadow, slim and jet-black, hundreds of feet long, sweeps over the surface of Taylor Crater.

Bado leans back and tips up his face.

The ship is like a huge artillery shell, gleaming silver, standing on its tail. It glides over the lunar surface, maybe fifty feet up, and where its invisible rocket exhaust passes, dust is churned up and sent gusting away in great flat sheets. The ship moves gracefully, if ponderously. Four heavy landing legs, with big spring-load shock absorbers, stick out from the base. A circle of portals glows bright yellow around the nose. A huge bull's-eye of red, white, and blue is painted on the side, along with a registration number.

"Shit," Bado says. "That thing must be a hundred feet tall." Four or five times as tall as his lost LM. "What do you think it weighs? Two, three hundred tons?"

"Direct ascent," she says.

"Luh?"

"Look at it. It's streamlined. It's built for landing on the Moon in one piece, ascending again, and returning to Earth."

"But that was designed out years ago, by von Braun and the boys. A ship like that's too heavy for chemical rockets."

"So who said anything about chemical? It has to be atomic. Some kind of fission pile in there, superheating its propellant. One hell of a specific impulse. Anyway, it's that or antigravity—"

The great silver fish hovers for a moment, and then comes swooping down at the surface. It flies without a quiver. Bado wonders how it is keeping its stability; he can't see any verniers. Big internal flywheels maybe.

As the ship nears the surface, dust comes rushing across the plain, away from the big tail like a huge circular sandstorm. There is a rattle, almost like rain, as heavy particles impact Bado's visor. He holds his gloved hands up before his face, and leans a little into the rocket wind.

The delicate little Russian lander just topples over in the breeze, and the bulbous ascent stage breaks off and rolls away.

IN THE MIRROR OF HIS BEDROOM HE STUDIED his graying hair and spread-leg pajamas.

Oddly, it had taken a while for him to miss his wife Fay.

Maybe because everything was so different. Not that he was sorry, in a sense; his job, he figured, was to survive here — to earn a living, to keep himself sane — and moping after the immaterial wouldn't help.

He was glad they'd had no kids, though.

There was no point searching for Fay in Houston, of course. Houston without the space program was just an oil town, with a big cattle pasture north of Clear Lake where the Manned Spacecraft Center should have been. El Lago, the Taylor housing development, had never been built.

He even drove out to Atlantic City, where he'd first met Fay, a couple of decades ago. He couldn't find her in the phone book. She was probably living under

some worried name, he figured.

He gave up.

He tried, a few times, to strike up relationships with other women here. He found it hard to get close to anyone, though. He always felt he needed to guard what he was saying. This wasn't his home, after all.

So he lived pretty much alone. It was bearable. It even got easier, as he got older.

Oddly, he missed walking on the Moon more than anything else, more than anything about the world he'd lost. He kept reliving those brief hours. He remembered Shade, how he looked bouncing across the lunar sand, a brilliant white balloon. How happy he'd seemed.

THE SILVER SHIP TOUCHES DOWN WITH A THUMP, AND THOSE BIG LEGS flex, the springs working like muscles.

A hatch opens in the ship's nose, maybe eighty feet from the ground, and yellow light spills out. A spacesuited figure appears, and begins rolling a rope ladder down to the surface. The figure waves to Bado and Williams, calling them to the ship.

"What do you think?" Bado asks.

"I think it's British. Look at that bull's-eye logo. I remember war movies about the Battle of Britain... Wherever the hell that's come from, it's some place very different from the worlds you and I grew up in."

"You figure we should go over there?" he asks.

She spreads her hands. "What choice do we have? We don't have an LM. And we can't last out here much longer. At least these guys look as if they know what they're doing. Let's go see what Boris thinks."

The cosmonaut lets Williams walk up to him. He is hauling at his ascent stage. But Bado can see the hull is cracked open, like an aluminum egg, and the cosmonaut's actions are despairing.

Williams points toward the silver ship, where the figure in the airlock is still waving at them.

Listlessly, the cosmonaut lets himself be led to the ship.

Closer to, the silver craft looks even bigger than before — so tall that when Bado stands at its base he can't see the nose.

Williams goes up the ladder first, using just her arms, pulling her mass easily in the Moon's shallow gravity well. The cosmonaut takes off his hoop, dumps it on the ground, and follows her.

Bado comes last. He moves more slowly than the others, because he has his tool carrier clutched against his chest, and it is awkward to juggle while climbing the rope ladder.

It takes forever to climb past the shining metal of the ship's lower hull. The metal here looks like lead, actually. Shielding, around an atomic pile? He thinks of the energy it must take to haul this huge mass of metal around. He can't help comparing it with his own LM, which, to save weight, was shaved down to little more than a bubble of aluminum foil.

The hull shivers before his face. Heat haze. He looks down. The wreckage of the little Russian lander, and Williams' LFU, has gone. The surface under the tail of this big ship looks unmarked, lacking even the raying of the landing. And the topography of the area is quite different; now he is looking down over some kind of lumpy, sun-drenched mountain range, and a wide, fat rille snakes through the crust.

"How about that," Williams says dryly, from above him. Her voice signal is degraded; the

*As the ship
nears the
surface, dust
comes rushing
across the
plain, away
from the tail
like a huge
sandstorm.*

amplifier on the LFU is no longer available to boost their VHF link.

"We're on Moon Five," he says.

"Moon Five?"

"It seems important to keep count."

"Yeah. Whatever. Bado, this time the geology's changed. Maybe one of the big primordial impacts didn't happen, leaving the whole lunar surface a different shape."

They reach the hatch. Bado lets the astronaut take his tool carrier, and clammers in on his knees.

The astronaut closes the hatch and dogs it shut by turning a big heavy wheel. He wears a British Union Flag on his sleeve, and there is a name stitched to his breast: *Taine*.

The four of them stand around in the airlock, in their competing pressure suit designs. Air hisses, briefly.

An inner door opens, and Taine ushers them through with impatient gestures. Bado enters a long corridor, with nozzles set in the ceiling. The four of them stand under the nozzles.

Water comes gushing down, and runs over their suits.

Williams opens up her gold sun visor and faces Williams. "Showers," she says.

"What for?"

"To wash off radioactive crap, from the exhaust." She begins to brush water over her suit arms and legs.

Bado has never seen such a volume of water in lunar conditions before. It falls slowly from the nozzles, gathering into big shimmering drops in the air. Gray-black lunar dust swirls toward the plug holes beneath his feet. But the dirt is ingrained into the fabric of his suit legs; they will be stained gray forever.

When the water dries they are ushered through into a third larger chamber. The walls here are curved, and inset with round, tough-looking portholes; it looks as if this chamber reaches most of the way around the cylindrical craft.

There are people here, dozens of them, adults and children and old people, dressed in simple cotton coveralls. They sit in rows of crude metal-framed couches, facing outward toward the portholes. They stare fearfully at the newcomers.

The astronaut, Taine, has opened up his faceplate; it hinges outward like a little door.

Bado pushes back his hood and reaches up to his fishbowl helmet. He undoes it at the neck, and his ears pop as the higher pressure of the cabin pushes air into his helmet.

He can smell the sharp, woodsmoke tang of lunar dust. And, overlaid on that, there is a smell of milky vomit: baby sick.

The Russian, his own helmet removed, makes a sound of disgust. "*Eto ozhasno!*"

Williams pulls off her Snocopy flight helmet. She is maybe forty, Bado guesses — around Bado's own age — with a tough, competent face, and close-cropped blonde hair.

Taine shoos the three of them along. "Welcome to *Prometheus*," he says. "Come. There are some free seats further around here." His accent is flat, sounding vaguely Bostonian. Definitely British, Bado thinks, probably from the south of England. "You're the last, we think. We must get away. The impact is no more than twelve hours hence."

Bado, hugging his tool carrier, walks beside him. "What impact?"

"The meteorite, of course." Taine sounds impatient. "That's why we're having to evacuate the colonies. And you alternates. The Massolite got most of them off, of course, but —"

Williams says, "Massolite?"

Taine waves a hand. "A mass transporter. Of course it was a rushed job. And it had some flaws. But we knew we couldn't lift everybody home in time, not all those thousands in the big colonies, not before the strike; the Massolite was the best we can do, you see." They come to three empty couches. "These should do, I think. If you'll sit down I'll show you how to fit the seat belts, and instruct you in the safety precautions ..."

"But," Williams says, "what has this Massolite got to do with ...?" She dries up, and looks at Bado.

He asks, "With moving between alternate worlds?"

Taine answers with irritation. "Why, nothing, of course. That's just a design flaw. We're working on it. Nonlinear quantum mechanical leakage, you see. I do wish you'd sit down; we have to depart ..."

Bado shucks off his PLSS backpack, and he tucks his helmet and his carrier under his seat.

Taine helps them adjust their seat restraints until they fit around their pressure suits. It is more difficult for the Russian; his suit is so stiff it is more like armor. The Russian looks young, no more than thirty. His hair sticks up in the air, damp with sweat, and he looks at them forlornly from his shell of a suit. "*Gdye tooz'yet?*"

The portholes before them give them a good view of the lunar surface. It is still Moon Five. Bado sees, with its mountains and that sinuous black rille.

He looks around at their fellow passengers. The adults are unremarkable; some of them have run to fat, but they have incongruously skinny legs and arms. Long-term adaptation to lunar gravity, Bado thinks.

But there are also some children here, ranging from babies in their mothers' arms up to young teenagers. The children are extraordinary: spindly, attenuated. Children who look facially as young as seven or eight tower over their parents.

The passengers clutch at their seat belts, staring back at him.

Bado hears a clang of hatches, and a siren wails, echoing from the metal walls.

The ship shudders, smoothly, and there is a gentle surge.

"*Myne nada idete k vrachoo,*" groans the Russian, and he clutches his belly.

AS THE YEARS WORE ON HE FOLLOWED THE news, trying to figure out how things might

be different back home.

The Cold War went on, year after year. There were no ICBMs here, but they had squadrons of bombers and nuclear submarines and massive standing armies in Europe. And there were no spy satellites; nobody had a damn clue what the Russians — or the Chinese — were up to. A lot of shit came down that Bado figured might have been avoided, with satellite surveillance. It slowly leaked out into the paper press, usually months or years too late. Like the Chinese nuking of Tibet, for instance. And what the Soviets did to Afghanistan.

The Soviet Union remained a monolith, blank, threatening, impenetrable. Everyone in the U.S. seemed paranoid to Bado, generations of them, with their bomb shelters and their iodine pills. It was like being stuck in the late 1950s.

And that damn war in Indochina just dragged on, almost forgotten back home, sucking up lives and money like a bloody sponge.

Around 1986, he felt a sharp tug of wistfulness. Right now, he figured, on the other side of that heat-haze barrier, someone would be taking the first steps on Mars. Maybe it would be his

Everyone
seemed
paranoid, with
their bomb
shelters and
iodine pills.
It was like
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the late 1950s.

old buddy, Slade, or someone like John Young. Bado might have made it himself.

Bado missed the live sports on TV.

IN FREE FALL, TAINIE GIVES THEM SPARE COTTON COVERSALLS TO WEAR, which are comfortable but don't quite fit; the name stitched to Bado's is *Leahue*, and on Williams', *Hassell*.

Bado, with relief, peels off the three layers of his pressure suit: the outer micrometeorite-like garment, the pressure assembly, and the inner cooling garment. The other passengers look on curiously at Bado's cooling garment, with its network of tubes. Bado tucks his discarded suit layers into a big net bag and sticks it behind his couch.

They are served food: stodgy stew, lukewarm and glued to the plate with gravy, and then some kind of dessert, like bread with currants stuck inside it. Spotted Dick, Taine calls it.

There is a persistent whine of fans and pumps, a subdued murmur of conversation, and the noise of children crying. Once a five-year-old, all of six feet tall, came bouncing around the curving cabin in a spidery tangle of attenuated arms and legs, pursued by a fat, panting, queasy-looking parent.

Taine comes floating down to them, smiling. "Captain Richards would like to speak to you. He's intrigued to have you on board. We've picked up quite a few alternate-colonists, but not many alternate-pioneers, like you. Would you come forward to the cockpit? Perhaps you'd like to watch the show from there."

Williams and Bado exchange glances. "What show?"

"The impact, of course. Come. Your German friend is welcome too, of course," Taine adds dubiously.

The cosmonaut has his head stuck inside a sick bag.

"I think he's better off where he is," Bado says.

"You go," Williams says. "I want to try to sleep." Her face looks worn to Bado, her expression brittle, as if she is struggling to keep control. Maybe the shock of the transitions is getting to her at last, he thinks.

The cockpit is cone-shaped, wadded right in the nose of the craft. Taine leads Bado in through a big oval door. Charts and mathematical tables have been stuck to the walls, alongside pictures and photographs. Some of these show powerful-looking aircraft, of designs unfamiliar to Bado, but others show what must be family members. Pet dogs. Tools and personal articles are secured to the walls with elastic straps.

Three spacesuits, flaccid and empty, are fixed to the wall with loose ties. They are of the type Taine wore in the airlock: thick and flexible, with inlaid metal hoops, and hinged helmets at the top.

Three seats are positioned before instrument consoles. Right now the seats face forward, toward the nose of the craft, but Bado can see they are hinged so they will tip up when the craft is landing vertically. Bado spots a big, chunky periscope sticking out from the nose, evidently there to provide a view out during a landing.

There are big picture windows set in the walls. The windows frame slabs of jet-black, starsprinkled sky.

A man is sitting in the central pilot's chair. He is wearing a leather flight jacket, a peaked cap, and — Bado can't believe it — he is smoking a pipe, for God's sake. The guy sticks out a hand. "Mr. Bado. I'm glad to meet you. Jim Richards, RAF."

"That's Colonel Bado," Bado shakes the hand. "U.S. Air Force. Late of NASA."

"NASA?"

"National Aeronautics and Space Administration..."

Richards nods. "American. Interesting. Not many of the alternates are American. I'm sorry we didn't get a chance to see more of your ship. Looked a little cramped for the three of you."

"It wasn't our ship. It was a Russian, a one-man lander."

"Really," Richards murmurs, not very interested. "Take a seat." He waves Bado at one of the two seats beside him. Taine takes the other, sipping tea through a straw. Richards asks, "Have you ever seen a ship like this before, Colonel Bado?"

Bado glances around. The main controls are a conventional stick-and-rudder design, adapted for spaceflight; the supplement-

tary controls are big, clunky switches, wheels, and levers. The fascia of the control panel is made of wood. And in one place, where a maintenance panel has been removed, Bado sees the soft glow of vacuum tubes.

"No," he says. "Not outside the comic books."

Richards and Taine laugh.

"It must take a hell of a launch system."

"Oh," says Richards. "We have good old Beta to help us with that."

"Beta?"

"This lunar ship is called Alpha," Taine says. "Beta gives us a piggyback out of Earth's gravity. We launch from Woomera, in South Australia. Beta is a hypersonic athodyd —"

Richards winks at Bado. "These double-domes, eh? He means Beta is an atomic ramjet."

Bado boggles. "You launch an atomic rocket from the middle of Australia? How do you manage containment of the exhaust?"

Taine looks puzzled. "What containment?"

"You must tell me all about your spacecraft," Richards says.

Bado, haltingly, starts to describe the Apollo system.

Richards listens politely enough, but after a while Bado can see his eyes drifting to his instruments, and he begins to fiddle with his pipe, knocking out the dottle into a big enclosed ashtray.

Richards becomes aware of Bado watching him. "Oh, you must forgive me, Colonel Bado. It's just that one encounters so many alternates."

"You do, huh?"

"The Massolite, you know. That damn quantum-mechanical leakage. Pessey just can't get the thing tuned correctly. Such a pity. Anyhow, don't worry; the boffins on the ground will put you to rights, I'm sure."

Bado is deciding he doesn't like these British. They are smug, patronizing, icy. He can't tell what they are thinking.

Taine leans forward. "Almost time, Jim."

"Ah!" Richards gets hold of his joystick. "The main event." He twists the stick, and Bado hears what sounds like the whirr of flywheels, deep in the guts of the ship. Stars slide past the windows. "A bit of showmanship, Colonel Bado. I want to line us up to give the passengers the best possible view. And us, of course. After all, this is a grandstand seat, for the most dramatic astronomical event of the century — what?"

The Moon, fat and gray and more than half-full, slides into the frame of the windows.

The Moon — Moon Five, Bado assumes it to be — looks like a ball of glass, its surface cracked and complex, as if scarred by buckshot. Tinged pale white, the Moon's center looms out at Bado, given three-dimensional substance by the Earthlight's shading.

The Moon looks different. He tries to figure out why.

There, close to the central meridian, are the bright pinpricks of Tycho, to the south, and Copernicus, in the north. He makes out the familiar pattern of the seas of the eastern hemisphere: Serenitatis, Crisium, Tranquillitatis — gray lakes of frozen lava framed by brighter, older lunar uplands.

He supposes there must be no Apollo 11 LM descent stage, sanding on this version of the Sea of Tranquility.

The Moon is mostly full, but he can see lights in the remaining crescent of darkness. They are the abandoned colonies of Moon Five.

Something is still wrong, though. The western hemisphere doesn't look right. He takes his anchor from Copernicus. There is Mare Procellarum, to the western limb, and to the north of that nothing but bright highlands.

"Fey," he says. "Where the hell's Mare Imbrium?"

Richards looks at him, puzzled, faintly disapproving.

Bado points. "Up there. In the northwest. A big impact crater — the biggest — flooded with lava. Eight hundred miles across."

Richards frowns, and Taine touches Bado's arm. "All the alternate Moons are different to some degree," he says, placating. "Differences of detail —"

"Mare Imbrium is not a goddamn detail," Bado feels patronized again. "You're talking about my Moon, damn it." But if the Imbrium

impact has never happened, no wonder the surface of Moon Five looks different.

Richards checks his wristwatch. "Any second now," he says. "If the big brains have got it right —"

There is a burst of light, in the Moon's northwest quadrant. The surface in the region of the burst seems to shatter, the bright old highland material melting and subsiding into a red-glowing pool, a fiery lake that covers perhaps an eighth of the Moon's face. Bado watches huge waves, concentric, wash out across that crimson, circular world.

Even from this distance Bado can see huge debris clouds streaking across the lunar surface, obscuring and burying older features, and laying down bright rays that plaster across the Moon's face.

The lights of the night-side colonies wink out, one by one.

Richards takes his pipe out of his mouth. "Good God almighty," he says. "Thank heavens we got all our people off."

"Only just in time, sir," Taine says.

Bado nods. "Oh, I get it. Here, this was the Imbrium impact. Three billion years late."

Richards and Taine look at him curiously.

IT TURNED OUT THAT TO BUILD A TELEPORT DEVICE — A "STAR TREK" beaming machine — you needed to know about quantum mechanics. Particularly the Uncertainty Principle.

According to one interpretation, the Uncertainty Principle was fundamentally caused by there being an infinite number of parallel universes, all lying close to each other — as Bado pictured it — like the pages of a book. The universes blurred together at the instant of an event, and split off afterward.

The Uncertainty Principle said you could never measure the position and velocity of any particle with absolute precision. But to teleport that was exactly what you needed to do: to make a record of an object, transmit it, and recreate the payload at the other end.

But there was a way to get around the Uncertainty Principle. At least in theory.

The quantum properties of particles could become entangled: fundamentally linked in their information content. What those British must have done is take sets of entangled particles, left one-half on their Moon as a transmitter, and plotted the other half on the Earth.

There was a lot of technical stuff about the Einstein-Podolsky-Rosen theorem that Bado skipped over; what it boiled down to was that if you used a description of your teleport passenger to jiggle the transmitter particles, you could reconstruct the passenger at the other end, exactly, from the corresponding jiggles in the receiver set.

But there were problems.

If there were small nonlinearities in the quantum-mechanical operators — and there couldn't be more than a billion billion billion part, according to Bado's researchers — those parallel worlds, underlying the Uncertainty Principle, could short-circuit.

The Moon Five Brits had tried to build a cheap-and-dirty teleport machine. Because of the huge distances involved, that billion-billion-billion nonlinearity had become significant, and the down thing had leaked. And so they had built a parallel-world gateway, by accident.

This might be the right explanation, Bado thought. It fit with Captain Richards' vague hints about 'nonlinear quantum mechanics.'

This new understanding didn't make any difference to his position, though. He was still stranded here. The teleport devices his researchers had outlined — even if they'd got the theory right from the fragments he'd given them — were decades beyond the capabilities of the mundane world Bado found himself in.

RE-ENTRY IS EASY. BADO ESTIMATES THE PEAK ACCELERATION IS NO more than a couple of G, no worse than a mild rollercoaster. Even so, many of the passengers look distressed, and those spindly lunar-born children cry weakly, pinned to their seats like insects.

After the landing, Alpha's big doors are flung open to reveal a flat, barren desert. Bado and Williams are among the first down the

rope ladders, hugging their pressure suits, and Bado's tool carrier, in big net bags.

Bado can see a small town, laid out with the air of a military barracks.

Staff are coming out of the town on little trucks to meet them. They are processed efficiently; the crew of the *Prometheus* gives details of where each passenger was picked up, and they are all assigned little labels and forms, standing there in the baking sunlight of the desert.

The spindly lunar children are lowered to the ground and taken off in wheelchairs. Bado wonders what will happen to them, stranded at the bottom of Earth's deep gravity well.

Williams points. "Look at that. Another *Prometheus*."

There is a launch rail, like a pencil line ruled across the sand, diminishing to infinity at the horizon. A silver dart clings to the rail, with a slim bullet shape fixed to its back. Another Beta and Alpha. Bado can see protective rope barriers slung around the rail.

Taine comes to greet Bado and Williams. "I'm afraid this is goodbye," he says. He sticks out a hand. "We want to get you people back as quickly as we can. You alternates, I mean. What a frightful mess this is. But the sooner you're out of it the better."

"Back where?" Bado asks.

"Florida." Taine looks at them. "That's where you say you started from, isn't it?"

Williams shrugs. "Sure."

"And then back to your own world." He mimes stirring a pot of some noxious substance. "We don't want to muddle the time lines, you see. We don't know much about this alternating business; we don't know what damage we might do. Of course the return procedure's still experimental but hopefully we'll get it right. Well, the best of luck. Look, just make your way to the plane over there. He points.

The plane is a ramjet, Bado sees immediately.

Taine moves on, to another bewildered-looking knot of passengers.

The Russian cosmonaut is standing at Williams' side. He is hauling his stiff pressure suit along the ground; it scrapes on the sand like an insect's discarded carapace. Out of the suit the Russian looks thin, young, baffled, quite ill. He shakes Bado's hand. "Do *svidaniya*."

"Yeah. So long to you too, kid. Hope you get home safely. A hell of a ride, huh?"

"*Mye nado k zvezdnomu vrachu*." He clutches his jaw and grins ruefully. "*Schastvenno pofoe. Zhilogo oospeshtaf*."

"Yeah. Whatever."

A British airman comes over and leads the Russian away.

"Goddamn," Williams says. "We never found out his name."

HE GOT A REPORT IN FROM HIS METEORITE STUDIES GROUP.

Yes, it turned out, there was a large object on its way. It would be here in a few year's time. Bado figured this had to be this universe's edition of that big old Imbrium rock, arriving a little later than in the Moon Five world.

But this rock was heading for Earth, not the Moon. Its path would take it right into the middle of the Atlantic, if the calculations were right. But the margins of error were huge, and, and, and...

Bado tried to raise public awareness. His money and fame got him onto TV, even, such as it was. But nobody here took what was going on in the sky very seriously anyhow, and they soon started to think he was a little weird.

So he shut up. He pushed his money into bases at the poles, and at the bottom of the oceans, places that mightn't be so badly affected. Somebody might survive. Meanwhile he paid for a little more research into that big rock in space, and where and when, exactly, it was going to hit.

THE RAMJET TAKES TEN HOURS TO GET TO FLORIDA. IT IS A MILITARY ship, more advanced than anything flying in Bado's world. It has the bull's-eye logo of the RAF painted to its flank, just behind the gaping mouth of its inlet.

As the ramjet rises, Bado glimpses huge atomic aircraft, immense ocean-going ships, networks of monorails. This is a gleaming world, an engineer's dream.

Bado has had enough wonders for the time being, though, and, before the shining coast of Australia has receded from sight, he's fallen asleep.

They land at a small airstrip, Bado figures somewhere north of Orlando. A thin young Englishman in spectacles is there to greet them. He is wearing Royal Air Force blue coveralls. "You're the alternates?"

"I guess so," Williams snaps. "And you're here to send us home. Right?"

"Sorry for any inconvenience you've been put through," he says smoothly. "If you'll just follow me into the van..."

The van turns out to be a battered diesel-engined truck that looks as if it is World War II vintage. Williams and Bado, with their bulky gear, have to crowd in the back with a mess of electronic equipment.

The truck, windowless, bumps along badly finished roads.

Bado studies the equipment. "Look at this stuff," he says to Williams. "More vacuum tubes."

Williams shrugs. "They've got further than we have. Or you. Here, they've built stuff we've only talked about."

"Yeah. Oddly, he's forgotten that he and Williams have come from different worlds."

The roads off the peninsula to Merritt Island are just farmers' tracks, and the last few miles are the most uncomfortable.

They arrive at Merritt Island in the late afternoon.

There is no Kennedy Space Center.

Bado gets out of the van. He is on a long, flat beach; he figures he is a way south of where, in his world, the lunar ship launch pads will be built. Right here there will be the line of launch complexes called ICBM Row.

But he can't see any structures at all. Marsh land, coated with scrub vegetation, stretches down toward the strip of beach at the coast. Farther inland, toward the higher ground, he can see stands of cabbage palm, slash pine, and oak.

The place is just scrub land, undeveloped. The tracks of the British truck are dug crisply into the sand; there is no sign even of a road near here.

And out to the east, over the Atlantic, he can see a big full Moon rising, its upper left quadrant, the fresh Imbrium scar, still gives a dull crimson. Bado feels vaguely reassured. That is still Moon Five; things seem to have achieved a certain stability.

In the back of the truck, the British technician powers up his equipment. "Ready when you are," he calls. "Oh, we think it's best if you go back in your own clothes. Where possible." He grins behind his spectacles. "Don't want you—"

"Muddying up the time lines," Williams says. "We know."

Bado and Williams shuck off their coveralls and pull on their pressure suits. They help each other with the heavy layers, and finish up facing each other, their helmets under their arms, Bado holding his battered tool carrier with its Baggies full of Moon rocks.

"You know," Bado says, "when I get back I'm going to have one hell of a lot of explaining to do."

"Yeah. Me too." She looks at him. "I guess we're not going to see each other again."

"Doesn't look like it."

Bado puts down his carrier and helmet. He embraces Williams, clumsily.

Then, on impulse, Bado lifts up his helmet and fits it over his head. He pulls his gloves over his hands and snaps them onto his wrists, completing his suit.

Williams does the same. Bado picks up his tool carrier. The Brit waves, reaches into his van, and throws a switch. There is a shimmer of heat haze.

Williams has gone. The truck has vanished.

Bado looks around quickly.

There are no ICBM launch complexes. He is still standing on an empty, desolate beach.

The Moon is brightening, as the light leaks out of the sky. There is no ancient Imbrium basin up there. No recent impact scar, either.

"Moon Six," Bado says to himself. "Oh, shit."

Evidently those British haven't ironed out all the wrinkles in their 'experimental procedures' after all.

He takes off his helmet, breathes in the ozone-laden ocean air, and begins to walk inland, toward the rows of scrub pine.

ON THE DAY, HE DROVE OUT TO MERRITT ISLAND.

It was morning, and the sea was low and bright over the ocean, off to the east, and the sky was clear and blue, blameless.

He pulled his old Moon suit out of the car, and hauled it on: first the cooling garment, then the pressure layer, and finally the white micrometeorite protector and his blue lunar overshoes. It didn't fit so well any more, especially around the waist — well, it had been fitted for him all of a quarter-century ago — and it felt as heavy as hell, even without the backpack. And it had a lot of parts missing, where he'd dug out components and samples over the years. But it was still stained gray below the knees with lunar dust, and it still had the NASA logo, his mission patch, and his own name stitched to the outer garment.

He scuffed down to the beach. The tide was receding, and the hard-packed sand was damp; his ridged soles left crisp, sharp prints, just like in the lunar crust.

He locked his helmet into place at his neck. To stand here, as close as he could get to ground zero, wasn't such a dumb thing to do, actually. He'd always remembered what that old professor at Cornell had told him, about the rocks bearing life being blasted from planet to planet by meteorite impacts. Maybe that would happen here, somehow.

Today might be the last day for this Earth. But maybe, somehow, some piece of him, fused to the glass of his visor maybe, would finish up on the Moon —

Moon Six — or Mars, or in the clouds of Jupiter, and start the whole thing over again.

He felt a sudden, sharp stab of nostalgia, for his own lost world. He'd had a good life here, all things considered. But this was a damn dull place. And he'd been here for twenty-five years already. He was sure that back home that old Vietnam War wouldn't have dragged on until now, like it had here, and funds would have got freed up for space, at last. Enough to do it properly, by God. By now, he was sure, NASA would have bases on the Moon, hundreds of people in Earth orbit, a couple of outposts on Mars, plans to go on to the asteroids or Jupiter.

Hell, he wished he could just look through the nonlinear curtains separating him from home. Just once.

He tipped up his face. The sun was bright in his eyes, so he pulled down his gold visor. It was still scuffed, from the dust kicked up by that British nuclear rocket. He waited.

After a time, a new light, brighter even than rocket light, came crawling down across the sky, and touched the ocean. □

*It turned out
that to build a
teleport device,
a 'Star Trek'
beaming
machine, you
needed to know
about quantum
mechanics.*

Look carefully — the answers are out there. But unfortunately, not all of us will survive to decode them.

I'M NOT USED TO HAVING private detectives calling on me. Regular police, sure; you can't be principal of a high school these days without having cops dropping in every now and then — drugs, vandalism, DUI; you name it, there are kids in every school that do it, and then the cops show up with a warrant to open their lockers and check their records. And we'd already had plenty of police investigating what happened to Marcus Wingott and Jeremy Proud, as well as people from the insurance company and the local fire department and everybody else who had an interest in the unidentified explosion that wiped out the third-floor faculty lounge and about two hundred thousand dollars' worth of the desktop computers the math students used, though it did, thank heaven, spare the bigger one in the basement that Wingott and Proud shared. So when this Bertrand Hammersmith came to see me, I let him in, because I certainly didn't want anyone thinking we had anything to hide.

He didn't look like the kind of private eye you see on television. He was plump and sad-faced, with rimless glasses over which he peered at me. But he acted like one. "I've been retained," he said, "by Dr. Wingott's former fiancée to investigate the circumstances of his death."

"Former fiancée?"

"Yes. She decided to call off their engagement some time ago, but she is still quite fond of him," he assured me.

"But there is nothing to investigate. The police have already investigated the matter thoroughly; they found no traces of explosives or of any sort of fire accelerants —"

"Just the blown-up building, right," he said, pulling a notebook out of his briefcase and pulling a scrap of paper out of the pocket in the back of his notebook. My heart sank when I saw what it was: the newspaper story from our little local paper.

"It says here, the fire warden claimed it looked as though the men themselves had exploded."

"I'm sorry to see that you have that," I told him, and I meant it. "The newspaper has apologized for printing it. Of course, nothing like that could have happened; the idea that human bodies can spontaneously burn or explode is simply an old superstition."

He pursed his lips, but said only, "All the same, my client wants to know what happened. As I understand it, Wingott was engaged on a secret project that had to do with, uh —" he glanced at the notebook — "the decimal expansion of the irrational

most distinguished scientist," I said, a bit snippily, I'm afraid. "He simply wanted to spend his retirement in some productive way, working with young people."

"Sure he did." Hammersmith didn't look convinced, but he didn't press the point. He took a clipping out of the notebook and handed it to me; it was Wingott's obituary, from a recent issue of *The Journal of the American Mathematical Association*. "It says here that Dr. Wingott was involved in a scandal a couple of years ago —"

I wasn't letting him get away with that. "Certainly not! There was no 'scandal.' He announced certain findings about pi which

ANOMALY in a DECIMAL EXPANSION

BY FREDERIK POHL
Illustration by Ron Chironna

number π ."

I was tired of that subject, too. "The only secret," I told him, "was in Dr. Wingott's head. He was obsessed on the subject. I suppose I can't complain, because if it hadn't been for that, he would certainly have been on the faculty of some ivy-league university instead of our admittedly not very prestigious suburban high school. I think the only reason he took this job was that he wanted to work with Dr. Proud."

"Who was," the detective said, referring to his notebook again, "a former cryptographer with the National Security Administration, who retired and came to work for you so he could double-dip."

"Now, that is quite unfair! Dr. Proud was a

did not seem to be confirmed. Happens all the time. That's how science progresses, Mr. Hammersmith."

"Sure it does. He said this irrational number turned out to be what they call rational after all."

"You could put it like that, I suppose. What Dr. Wingott said was that at a certain point in the decimal expansion, it came at about the two trillionth decimal, there was a sequence of one million zeroes, followed by a string of additional digits, followed by zeroes as far as he could carry the calculations."

He gave me one of those looks over the tops of his glasses. "He said that last string of numbers was a message from some master race of extra-terrestrial aliens."

"He said it was possible that it might be something of the sort."

"And he got the idea from some sci-fi book."

"Now you've gone too far, Mr. Hammersmith! It's true that there was a book, *Contact*, which said something of that sort; it was written by an actual scientist, though, Carl Sagan, not one of your sci-fi hacks."

"But Wingott really believed it," the detective said. "That's why my client dumped him. She says he was really obsessed about translating the message."

"Obsessed" is a stronger word than I would use, but yes."

"And that's why he wanted to work with

and forget it ever happened, but I can't bear to do that."

Sorry to bother you with this ... but I wanted you, at least, to know that I wasn't crazy.

With love,
Marc

"So," I said, handing the letter back to Hammersmith, "Wingott thought he'd proved his point. But we'll never know; he's dead."

"But you still have the computer Wingott and Proud used," Hammersmith said.

"Of course. And naturally it has been checked out; there's nothing there."

the detective's disk it quickly displayed that string of digits Wingott had claimed to discover at the end of *pi*, followed by a legend: *Password*.

"Damn," I said. "Excuse me, Mr. Hammersmith. But I'm afraid we don't know the password, do we?"

"Maybe we do," he said. "My client said in the old days Dr. Wingott used to use her birthday, his father's license plate and a Holiday Inn room number that was significant to them for some reason. Type this in, please."

It worked. Wait, said the computer, and began grinding away. Wingott and Proud had insisted on a large and quite fast machine, but



this Dr. Proud."

I didn't answer, only shrugged. He didn't need confirmation from me. I was beginning to suspect that he already knew more than I did, and a moment later he proved it. He pulled another piece of paper out of his notebook, unfolded it and handed it to me. It was a Xerox of a letter, scribbled in haste in Wingott's almost unreadable script, with the name in the salutation rubbed out; it said:

Dear:

We did it. There is a message, and Proud's decryption algorithm has retrieved it. It's unpleasant. I don't know if I dare publish it. Proud has no doubts. He says we have no choice. He wants to destroy the whole thing

"Are you sure? Isn't it possible that he kept his work intact, but hid it in some way on the computer?"

I said positively, "No. Several of our math teachers have gone over it. There's nothing there."

Hammersmith sighed. "Don't be so sure," he said. "This came with the letter." And he handed me a microflop, on which someone had written with a purple *Flair Access* code, *J.T. Proud decryption algorithm*. "Can we go take a look at that computer?" he asked.

After the accident I kept the computer room locked — too many of the junior faculty were using it to play *Minesweeper* — but once I switched the power on and inserted

it processed its data for a full minute, while my eyes were glued to the screen and Hammersmith was hanging over my shoulder. I don't know what was in his mind. I know what I was thinking. I was scared. A message from some super-race, capable of altering the basic constants of the universe to carry information — it was frightening to consider, even more frightening to know what in a moment we might see it ...

And then the answer appeared. "Jesus," said Hammersmith softly. "It's a damn bumper sticker."

For what it said was nothing more than:

If you can read this,
you're too damn close. □

JUST A COUPLE OF EXPERIMENTAL...

Continued from page 44

the beast saw Vossstoff and Nimmitz he cried out and reached for his blasters. Vossstoff deftly fired his Bettelthine Munitions Tivva Gun, which promptly rendered the beast unable to think of anything more pressing than who played the lovable time-otter Brooklyn in the 2387 holo-series *Have Black Hole Will Dilate*.

That set the alarm clixoes sounding, and in seconds fourteen other alien coffee tables scurried around the corner, their blasters whirring. Against them Vossstoff used his Bettelthine Munitions Psionic Muzak Bomb, which upon exploding immediately filled the corridor surrounding the aliens with obscenely bastardized versions of their favorite songs. The mob immediately fell to the deck, writhing and moaning in unimaginable aesthetic agony. Vossstoff and Nimmitz stepped over the pathetic convulsing forms and moved on.



THE THIRD AND FINAL OBSTACLE GREETED them at the portal to the Pachino parlor. It was an alien coffee table that oddly enough carried no specialized weaponry at all — instead, it was clad in an all-concealing black slipcover that to Vossstoff's expert eyes instantly marked it as its civilization's nearest equivalent to a master ninja. Its war cry resembled the sound a cinderblock makes when thrown from a great height into a porcelain bowl filled with cats.

Acting with the speed of thought itself, Vossstoff whipped out his Bettelthine Munitions Poor Self Image Generator, which instantly caused the alien martial artist to sink off into a neutral corner to dwell at great length on the bad impression he always made on people.

"I can't believe this!" Nimmitz gasped excitedly, as he and Vossstoff reloaded in a nearby utility niche. "We're actually winning! Since when does that happen?"

"Since I first hooked up with you?" asked Vossstoff. "Absolutely never."

"Maybe our luck's changing. You used to say we were straining the law of averages to the breaking point; maybe it's finally kicked in."

"Maybe. And maybe the entire universe will put a paper bag over its head and breathe deeply as a cure for entropy."

Nevertheless, as soon as the last door between the two space rogues and the backup control room irised open, both Vossstoff and Nimmitz courageously leaped through, their Bettelthine Munitions You Can't Shoot Me, You've Just Had a Crisis of Conscience generators cocked and ready — only to trip a proximity-activated Teleportation Grid that ensured them the second they passed through the door. A brief moment of blissful nonexistence later, both men found themselves re-integrated inside a pair of humanoid-sized Stasis Fields that imprisoned them beside a huge pulsating archway labeled ALTERNATRIX in neon Dom Casual. [Mud] capered at the far end of the chamber, tinkering with the controls, he did not bother to turn around, but he did chuckle evilly, in a particularly snotty way that strongly reminded Vossstoff of himself. "You know," he remarked, conversationally, "it's funny. There are any number of embarrassing things that can befall an unlucky sentient in this cruel and capricious universe. So many that cataloguing them and voting on your favorites has become one of the galaxy's most popular hobbies. We collect the most appalling stories, rate them according to uniqueness and severity, publish gossipy newsletters on our findings, and hold conventions where we toast all the people who have recently thrown away the last shreds of their tattered dignity. It is widely accepted among us connoisseurs that the second most humiliating thing that could ever possibly happen to anybody would be finding oneself outsmarted by Ernst Vossstoff and Karl Nimmitz. You don't know how relieved I am that this hasn't happened to me."

"What took first place?" asked a curious Nimmitz.

"Being born you two." The dozens of heads arrayed atop [Mud] all

swivelled as one. "In any event, we have followed your careers with great incredulity, over the past thirty years or so, and you have been a great inspiration to all of us in the hobby. In fact, we are thinking of renaming the Year's Biggest Loser trophy after you. The Mitz-Off. What do you think?"

"I dunno," Nimmitz said doubtfully. "It kind of sounds like an award you're not allowed to touch."

"Indeed. And what could be more appropriate, given the subject matter?"

The desperately struggling, beet-red, completely helpless Vossstoff stuck out his lower jaw defiantly. "Enough of this, [Mud]! We know your Alternatrix is a fraud, because if it wasn't, you and your ridiculous species would have used it yourselves a long time ago! What are you really after?"

"Frankly?" asked [Mud]. "Revenge!"

"Against who?"

"Against everybody!" [Mud] thundered. "You see, the Alternatrix does work, precisely as advertised, and we did use it, fleeing this place for what we foolishly imagined to be forever, and we got sent to a wonderful place where the skies were plaid and the air was rancid and the people were friendly and nobody ever tried to put dolbes on us. Unfortunately, even paradise is subject to the Heisenberg Uncertainty Principle, and the very act of experiencing such a perfect place causes random heterodyning changes that don't even make themselves apparent for a year or so. After that, paradise is quickly reduced to yet another run-of-the-mill rotten place just like this one."

Nimmitz's eyes went wide and sympathetic. "It must have been a real shock for you when you saw your first dolly."

[Mud] shuddered meaningfully. "Too true. — In any event, once we escaped the charmed ruins of our ideal universe, we threw what our statisticians have decreed the single biggest sin in the history of intelligent life, excepting only George C. Scott's refusal of the Oscar for *Patton*. We decided that if we were going to have our expectations toyed with like that, then so was everybody else. It became our fondest dream to have the entire population of this galaxy suffer that kind of deformative angst, except without the possibility to escape otherwise. The only problem was that we could not accomplish this without going into business, and we cannot go into business without the proper production capital, and we cannot get that capital unless you manage to retrieve Dejah Shaprio from wherever she's secreted herself. We had hoped you would cooperate willingly, but now —"

Vossstoff grit his teeth heroically. "Now that I know there's no possible way I can profit from this insane scheme, there's no way you can get me to help."

"Oh, yes, there is. And for free, too. You see, I've just cleverly reversed the polarity of the Alternatrix, so it can send you to your worst possible universe, the one that for you would be a hell beyond all imagining. I'm going to give you a brief taste of what it's like, just long enough to break your spirit... then I'll yank you back and threaten to exile you there forever unless you provide us with what we want."

Nimmitz looked at his ex-partner. "I don't like this place, Ernst."

"Neither do I," said Vossstoff, as he reeled from all the potential horrors awaiting him mere seconds away. "Listen! [Mud]! You don't have to do this! I'll cooperate! I'll do anything you say! I'll accept your original offer of vast wealth and power! I'll —"

"Too late," chirped the alien coffee table, as he flicked the switch. "Ernst is the one with the bigger attitude problem, so he goes first."

The Alternatrix pulsed, and Vossstoff disappeared —

— only to instantly reappear elsewhere in the room, his Bettelthine Munitions All Right, Now I'm Righteously Pissed Rifle inflating his already irate facial expression into the kind of look that actually, literally, can kill. The image of a glaring Vossstoff was recreated inside [Mud]'s mind, at some ten billion times its real life size; and neither Vossstoff or Nimmitz would ever know whether it was truly mortal fear or just overwhelming revulsion that burst the machivellian alien's heart. Either way, [Mud] tumbled to the deck, no longer a coffee table so much as a collapsible dinner tray. Vossstoff stood over him, panting heavily, his congenitally stern expression seguing from astonishment to realization to out-and-out depression.

Nimmutz leaped up and down inside his stasis field. "Ernst! Ernst! That was ... totally awesome! How did you do that?"

Vossoff looked awfully upset for a guy who'd just escaped the inescapable death trap, defeated the ranting alien villain, and saved the universe. "I didn't do anything," he said numbly. "Apparently, the Alternatrix simply decided that I was already in the worst possible universe for me. Not an unreasonable value judgement, overall, considering that this is the place where I get arrested, stranded on uninhabited planets, transformed into foul-smelling alien moss, battered insensate by marbles, inflated into mountain-sized lumps of quivering animal fat, and being driven insane in mental institutions ... but it's still a tremendously depressing thing to find scientifically verified like this."

Nimmutz's eyes widened. "B-but ... doesn't this mean we've won? Doesn't it mean that you're going to release me from the Stasis Field and help me comb alternate universes for Dejah?"

Vossoff shook his head, a cruel, unbearably paternal smile just beginning to play at the corners of his lips. "You truly must believe me almost as adrift-pated as yourself. Me, free you? The paramonium who betrayed me to my ex-wife? Rescue Dejah? The mean-spirited nutron who transformed me into a mountain of quivering goo? No thank you. In either instance."

Nimmutz pounded on hands against the edges of the Stasis Field. "B-but ... you promised ..."

"I never promised anything, idiot. You merely fell prey to the notorious Unger Principle and assumed. No, I'm happy to say, both you and Dejah can sit where you are and rot, but I'm going to use the Alternatrix to locate another universe for myself. Someplace neither the endless parade of torments and humiliations that this particular cosmos has become, nor the ideal paradise that [Mad] assured us would deteriorate within one year — just someplace a little closer to Heaven than Hell, where an enterprising evil genius might actually stand a chance of conquering the vast interstellar empire that he deserves."

"B-but Ernst! You can't ... 'Dejah ...!'"

Vossoff blackened the other man's stasis field, instantly trapping him in silence and darkness. It felt good to realize that his long nightmare was over, that he'd never have to listen to that whining voice again, and that he was about to get everything he'd ever deserved. So good that for the first time in more years than he cared to count, he actually threw back his head and indulged in a spirited round of crazed maniacal laughter ... and then he bent over to examine the Alternatrix controls.

They were absurdly simple. He estimated six and one half minutes before he mastered them ...

... SIX AND ONE-HALF MINUTES THAT KARL NIMMUTZ EXPERIENCED screaming soundlessly inside his stasis field, certain that he was trapped there forever, and that he'd never see his beloved Dejah again.

They were not a very enjoyable six and one-half minutes. Indeed, a sentiment with more of a mind to lose would have become irrevocably, irretrievably mad, forever lost in nightmares from his unfettered id. Nimmutz's hallucination was considerably more arcane: a little white ball of light forever bouncing back and forth between two rectangular paddles. Nimmutz did not know what these creatures were, or what they wanted of him, but he did know that their strange customs were well beyond his simple comprehension. When he realized that they would continue this dance for him for as long as he was alive to watch it, he began to shriek ...

... and then the stasis field abruptly switched off, and Nimmutz pitched forward, in a headlong flight that was only stopped by the dense molecular cohesion of the nearest bulkhead wall. He bounced off, breathing heavily, and frantically searched the room for signs of the vengeful Ernst Vossoff ...

... finding instead the beaming, beautiful, radiantly happy Dejah Shapiro, at the Alternatrix controls. "Hello, my little junior space ranger."

He stumbled into her arms. "Dejah! What —"

She slapped him with a kiss. And what with one thing or another, perhaps best left to the fertile imagination of the reader, he some-

how didn't get around to asking her for an explanation for some time.

Two days later, she managed a breathless, "Well, it's like this," but still found herself far too busy to actually continue beyond that point.

This went on at nauseating length, fond reunions being what they are.

And then they embarked upon a second honeymoon, and immediately after that a third, and then got involved with the battle to stop the Plebion invasion from Sector Five, and then out of a need to rewind, took a side trip to 20th century Earth where they amused themselves flying low over random motorists on isolated rural highways. But eventually (perhaps months or even years later, Nimmutz's attention span being the wonky thing that it was), when they were lounging around her palatial villa on Cascarnoon IV, he finally got around to asking her again, and Dejah, resigned to the inevitable, finally explained. "It's quite simple. I knew that galactic civilization was doomed if I ever permitted myself to fall into their hands. So I transported myself to someplace not quite paradise, but which I'd always wanted to visit for a week or two ..."

"Which was where?"

She lowered her eyes demurely. "Chocolate heaven."

"Excuse me?"

A faraway, dreamy tone entered her voice. "Chocolate heaven," she repeated, with an ardent that made her pupils dilate. "Imagine: an entire universe where even the darkest, richest, sweetest, and most decadent chocolate ever concocted possesses the same number of calories as distilled water. I didn't have to deny myself there at all; I was able to stuff my mouth with eclairs and crunch bars and seven-layer Black Forest cake and toffee and cocoa, ton after ton of it, and it was all guilt-free, and I came back weighing less than I did before I left. Of course, I didn't want to stay there forever, since even I can get sick of chocolate after a while, but that just means I'll be able to remain dedicated to my diet now."

Nimmutz licked his lips. "I see."

"Anyway, I figured that once you were unable to find me, they'd recruit Ernst. And I knew that it was inevitable that he wouldn't cooperate. So before leaving, I programmed the machine with two hastily-written subroutines. The first would bounce him back into this universe, in a more tactically advantageous position, the instant they tried to send him somewhere he wouldn't like. The second summoned me back automatically, the instant he went through willingly, to someplace he thought he wanted to be."

As always, Nimmutz was boggled. "And Ernst? Where is he now?"

"According to what the readouts said, before I dismantled the Alternatrix forever, he instructed the machine to send him someplace where he'd fit in perfectly. I'm tempted to rebuild it and summon him back so I can give him a piece of my mind for betraying you the way he did ... but no. Let's hope he finally found what he's been looking for. After saving the galaxy, he deserves it."



HAT HE DID.

And yes, Ernst Vossoff did find what he asked for.

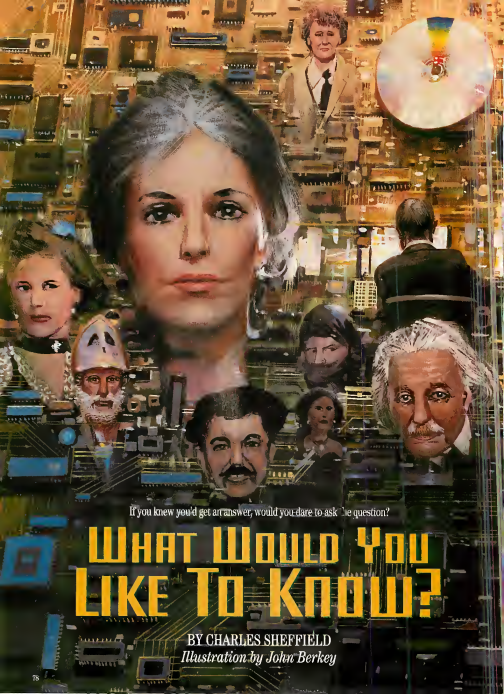
It's a universe where such factors as gravity, motion, and entropy simply don't exist, because there's never been any reason for them to exist; a universe where time itself froze solid at the moment of its creation; a universe that happens to be entirely matter, but for a small pocket of empty space that, by pure random chance, just happens to be precisely the size and shape of a single man. A single, screaming, not very happy, certainly not very comfortable man, who no doubt would die immediately were it not for the local physical laws that keep him aware and conscious but wholly, completely motionless.

This is the universe where Ernst Vossoff has been dropped.

And, as it happens, he does, indeed, literally ...

... fit in.

Like a glove. □



If you knew you'd get an answer, would you dare to ask the question?

WHAT WOULD YOU LIKE TO KNOW?

BY CHARLES SHEFFIELD
Illustration by John Berkey



W

EEDAYS, THE LIBRARY WAS QUIET between half-past one and three. People who had come during their lunch hour were all gone, and it was still too early for the after-school kids to dash in, hunting for homework references.

So early afternoon was the perfect time — Jack Mellon grunted with resignation, eased himself into the chair, and turned on the terminal — the perfect time if there was ever a good time, or even a halfway decent

time, to find out what tricks and snares had been introduced into the latest upgrade.

The new disk had been delivered that morning. There was once a time, now long gone — Jack stabbed moodily at the keyboard with his left index finger — when you had a book in the library, or you didn't. The file cards showed what was in, and what was out, and that was it. And it was books, all books. By God, that dated him. Now there were interlibrary loans, for tapes, CDs, and database collections everywhere from here to Timbuktu. You could order materials from

anywhere; and the kids seemed to know by instinct how computer query systems worked, and hovered around sniggering while you propped your way through the new access protocols in search of what they needed.

As the screen lit up, it occurred to Jack that there were stranger signs that you had entered Geeserland than an AARP membership card. There ought to be a progressive standardized test. If you have to read the manual to understand a computer procedure, you are a Geezer candidate. If you can't see the figures on handheld Game Boy sets, even with your glasses on, you are probably a Geezer. If you can remember those events — Neil Armstrong on the Moon, Kent State, the Kennedy assassination, the Bay of Pigs, the Checkers speech — you are certainly a Geezer.

The first page of text flashed on, complete with standard verbiage for rights protection and legal disclaimers for anything resulting from the use of the system. Jack regarded the screen with a jaundiced eye. He had seen it a hundred times before.

These days young people probably used more recent events for Geezer definition: going to see *Star Wars* when it first came out; watching the Challenger explosion on TV, over and over; the Berlin Wall coming down. Remember those things, and you were on the wrong side of age's Great Divide. If Josie were still alive, she would have had a great time making her own list, and gleefully pointing out cases where although Jack was a Geezer, she — eight years younger — was not.

But Josie, against all justice and all expectations, was three years dead. On early mornings in spring and fall, after a night when sleep came hard, he would go outside and rail at the dawn. She came from a long-lived family, he did not. She was a woman, and women lived longer than men. He had smoked for thirty years before he finally managed to quit, she had never even tried one. He had expected to leave Josie a widow, with plenty of time to remarry if she felt like it.

Why hadn't he gone first?

The rising sun said nothing. Nowhere in nature was there a promise of fair play.

Jack frowned at the screen. While his thoughts had been wandering, a new page of material had appeared. It didn't look like anything in any previous release of the library query system.

DEFINE YOUR LOCATION.

After a moment, Jack typed: <Port Markie Branch Library.

THE FORT MARKIE BRANCH LIBRARY HAS BEEN SELECTED AS THE INITIAL TEST SITE FOR A NEW AND IMPROVED SEARCH-AND-RETRIEVAL SYSTEM. THE NEW SYSTEM DIFFERS FROM THE OLD ONE IN MANY SIGNIFICANT WAYS.

Jack groaned. Why did everything always have to be improved, when it was just fine the way it was?

ONE: QUERIES CAN NOW BE NATURAL LANGUAGE. TYPE YOUR SEARCH QUESTION, EXACTLY AS IF YOU WERE ASKING IT OF ANOTHER HUMAN. THE ANSWER WILL BE PROVIDED IN STANDARD ENGLISH. TWO: THE NUMBER OF DATA BASES TO WHICH YOU HAVE ACCESS HAS BEEN GREATLY ENLARGED. THREE: THE DISK YOU HAVE RECEIVED CONTAINS NEW HARDWARE AS WELL AS NEW SOFTWARE. A SEXTILLION BYTES OF RAPID ACCESS ONLINE DATA STORAGE ARE PROVIDED. A QUANTUM PROCESSOR, CAPABLE OF EMPLOYING A VARIETY OF QUANTUM MECHANICAL FEATURES, IS INCLUDED. THE NEW DISK SHOULD REMAIN PERMANENTLY IN PLACE, IF THE NEW SEARCH-AND-RETRIEVAL SYSTEM IS TO OPERATE AT FULL CAPABILITY.

The message vanished. Instead of the usual menu or set of icons from which to make a selection, a handful of words appeared:

WELCOME TO THE FORT MARKIE BRANCH LIBRARY SERVICE. WHAT WOULD YOU LIKE TO KNOW?

Should he type in, Nothing, I'm just futzing around?

He typed, <What is a sextillion?

DO YOU KNOW WHAT A BILLION IS?

Odd, to answer a question with a question. This was nothing remotely like the old query system.

<Yes.

ARE YOU THE FORT MARKIE BRANCH LIBRARIAN?

<Yes.

A SEXTILLION IS A BILLION BILLIONS. TO PUT THIS IN TERMS MORE USEFUL TO LIBRARIANS, THE AVERAGE NOVEL CAN BE STORED IN ABOUT A MILLION BYTES. YOUR SYSTEM NOW HAS ONLINE STORAGE SUFFICIENT FOR A THOUSAND BILLION BOOKS. BY WAY OF COMPARISON, THE FORT MARKIE LIBRARY CURRENTLY HAS 78,376 BOOKS IN PRINTED FORM.

Jack leaned back and whistled softly. The system was telling him that it had ten million times as much storage as the whole library. WHAT WOULD YOU LIKE TO KNOW?

He hadn't intended to ask questions. He had expected the quiet hour, and more, to be used in learning the rules of the new query system.

How smart was the new software? Could it recognize and respond to an implied question?

<I don't know what a quantum processor is or does.

HOW MUCH PHYSICS TRAINING HAVE YOU HAD?

A query system with a difference — it asked questions of the user; and it did recognize when a question was implied. He had known department store staff with less sense.

<I did high school physics, but that was forty-five years ago. I read the library copy of *Scientific American* every month, the day that it comes in.

A QUANTUM PROCESSOR TAKES ADVANTAGE OF THE FACT THAT PARTICLES ON THE SUBATOMIC LEVEL CAN EXIST IN SEVERAL DIFFERENT STATES SIMULTANEOUSLY. (THIS CAN BE TRUE OF LARGER SYSTEMS, TOO, BUT DISCUSSION OF THAT WOULD FORM A DIGRESSION FOR PRESENT PURPOSES). A QUANTUM PROCESSOR USES THIS FACT TO PERFORM MANY BILLIONS OF CALCULATIONS IN PARALLEL. WITH THE DESIRED FINAL ANSWER REACHED BY RESOLUTION OF THE MULTIPLE POSSIBLE QUANTUM STATES TO A SINGLE OBSERVED STATE. IS THAT CLEAR?

<No. Not even close to clear.

THEN IT IS RECOMMENDED THAT YOU DO NOT PURSUE THE ISSUE FARTHER. THE SUBJECT IS A COMPLEX ONE, AND MORE SIMPLICITY IN EXPLANATION CAN ONLY BE ACHIEVED AT THE EXPENSE OF REAL MEANING.

In other words, forget it, Jack. You're too dumb to understand anything this hard.

Jack glanced at the clock. Another few minutes and the school rush would begin. Time enough for one more question.

<There is a book, *The Undying Monster*. It was published back in the 1890s, and I think that the author was named Kerrouish. Do you have it in your online database?

YES.

<Can you print a copy for me — here at the library?

YES. DO YOU HAVE A PREFERRED TYPE AND SIZE?

<How about Times Roman, 12-point?

CERTAINLY.

The laser printer over by Jack's desk began the preliminary rustle of the paper feed. He hadn't read that book for thirty-five years, though he had wanted to, vaguely, for a long time. But what about copyright infringement, printing a whole book like this? Did the software make a record of what it was doing, feeding the information back to a central library file? More important — from his point of

view — what other treasures of reading, normally inaccessible in Fort Markle, might be in the online disk library?

But something was definitely peculiar here. What the new retrieval system seemed to offer was far more than an update in capability. It was almost as though the new program had its own consciousness.

Jack started to rummage in his Out tray for the cardboard packet that the new disk had arrived in, then forgot about it as the automatic doors of the library swung open. School was out. And here they came, heading straight for the terminals scattered around the library. Thirty more seconds, and they would be at his desk, complaining as they always did about the changes made to the retrieval system, then just as quickly mastering it in a tenth of the time that it took him.

He watched, and waited. When five minutes passed without signs of outrage, he left the closed-off area where his desk was located and went on a stroll around the main floor. The terminals were all in use. Every one displayed the familiar menu of the old query system.

Jack returned to his desk. He typed, *cl* the new search-and-retrieval system available only on this terminal?

**YES. YOUR REACTION WILL BE SOUGHT,
BEFORE THE SYSTEM IS MADE AVAILABLE TO
YOUR OTHER USERS.**

While Jack was still reading the answer, a boy appeared on the other side of the counter. It was Andy Ricks, ninth grade know-it-all.

"The computer says there's a copy of a movie called *Remains of the Day* in the tape library. And there isn't."

"You are proposing to watch *The Remains of the Day*?" Jack didn't try to hide his surprise.

"Miss Adler told us to. It's for history. It's got something in it about some old war."

"The Second World War, and the events leading up to it," Jack remembered that war, at least the end of it. He was German, sure and certain.

Instead of saying any more to Andy Ricks, Jack typed into his terminal, *<Where are the library's videotape copies of the movie, The Remains of the Day?*

An hour ago he would have dismissed as insanity any suggestion that a search-and-retrieval system could answer such a question. Now he was not surprised to see the screen filling with a response.

"It's no good doing that," Andy Ricks said. "I already tried it."

"There are two library copies," Jack was reading from the screen. "One was taken out three days ago, by Linda Adler. I guess we can forget about that one. The other was taken out five minutes ago, by Stephanie Miller. She must have been in the checkout line when you did your query, that's why it showed as still in."

The computer's reply offered an additional comment and question: **THE TWO COPIES OF THE NOVEL BY KAZUO ISHIGURO, ON WHICH THE MOVIE, THE REMAINS OF THE DAY, IS BASED, ARE CHECKED OUT OF THE LIBRARY. DO YOU WISH INFORMATION ON THEM?**

Jack typed, *<No*, and said, "If you get a move on, Andy, you can probably catch Stephanie Miller, and ask to watch it with her. She may still be in the library."

"Are you kidding? She's a total herb." Andy's face showed utter revulsion. But as Andy moved away Jack sensed in him a new respect. Jack had found the information about the movie, and in far less time, he suspected, than it had taken Andy to make his own search.

He couldn't wait to see what else the new library service could do, but he had to, because the afternoon routine was taking over. A loud group of youths had to be removed to continue their larking around outside. Not bad kids — he had known them all since kindergarten — but they were at the stage where Jessie called boys "runners in the Testosterone Derby." Three other regulars, two men and a woman who were infinitely apologetic at needing his assistance, had to be helped through the Braille service. How did you tell them they were what made the job worthwhile? You just said it, but not more than once a year, because that would produce an embarrassment worse than the apologies.

And then before he knew it, it was six o'clock and closing time, and he had to rush over to the Zellners' house for an early dinner, because

he had promised, even though he didn't want to. Darrell and Clara were the world's nicest people, but they never stopped trying. Tonight it was recently divorced college friend of Clara's, living in Pittsburgh and passing through on a crosscountry drive. She was nice and very pretty in a nervous sort of way. Darrell and Clara served dinner in such a fashion that he and Lana were left to talk to each other for substantial periods, and they did, and it was all fine. But at nine-thirty he couldn't wait to get into his car, where the printout of *The Undying Monster* was waiting, and drive home to begin reading it.

How do you send signals to close friends saying, Look, I appreciate what you are trying to do for me, but I don't *seem* what you are trying to do for me?

He read until 2 o'clock in the silent house, knowing as he switched off the bedside light that he would wake like clockwork at 6:30, drag himself out of bed and to work, and yawn through the morning.

Except that he didn't. The prospect of the new query system, with its still untapped potential, brought him alert and early to the library.

He would have an hour and a half to himself before the library opened to the public. There were a dozen administrative tasks to work on, but he ignored them. He went to the terminal, with its waiting message: **WHAT WOULD YOU LIKE TO KNOW?**

<I want to know more about this new search-and-retrieval system. How much testing has been done on it?

THE HARDWARE HAS BEEN THOROUGHLY TESTED. THE SOFTWARE IS NEED ADAPTIVE, WHICH MEANS THAT IT WILL MODIFY ITS OWN RESPONSES TO SUIT THE DEMANDS OF A PARTICULAR ENVIRONMENT; THEREFORE, EACH INSTALLATION OF THE SYSTEM TESTS AND EVALUATES ITSELF. PERFORMANCE IS MEASURED BY USER SERVICE AND USER SATISFACTION.

<Can I ask any question — any question at all?
CERTAINLY. HOWEVER, AN ANSWER IS NOT ASSURED.

<Stop being coy. You know what I mean. Are there questions that the system will not answer?

YES. THE SYSTEM WILL NOT ANSWER ANY QUESTION THAT IT CANNOT ANSWER. HOWEVER, AN ACCEPTABLE SUBSTITUTE ANSWER MAY BE PROVIDED TO AN UNANSWERABLE QUESTION. THE SYSTEM ALSO WILL NOT ANSWER A QUESTION WHEN IT BELIEVES THAT THE REPLY, EVEN IF AVAILABLE, IS NOT IN THE BEST INTERESTS OF THE QUESTIONER.

<Are you my brother's keeper?
NO ANSWER IS DEEMED NECESSARY TO THAT QUESTION.

In other words, stop messing about. Ask real questions. Just what were the limits of the new system's capabilities?

<Do you have access to pictures and movies, as well as books and papers?

THERE IS ACCESS IN PRINCIPLE TO ANY MATERIALS THAT EXIST IN DIGITAL FORM. IN PRACTICE, SOME DATA BANKS ARE CLOSED FOR REASONS OF PERSONAL PRIVACY OR PUBLIC SECURITY AND SAFETY. IF INFORMATION MUST BE CONSTRUCTED, RATHER THAN RETRIEVED, PROCESSING LOADS MUST ALSO BE CONSIDERED. SERVICE TIMES MAY VARY WIDELY.

<What do you mean, vary widely?

SERVICE TIMES MAY RANGE FROM MICROSECONDS, FOR MATERIAL IN THE ONLINE DATA BASE, TO HOURS OR DAYS OR EVEN YEARS WHERE THE NECESSARY INFORMATION MUST BE CONSTRUCTED. AN ACCEPTABLE SUBSTITUTE ANSWER MAY BE PROVIDED TO A QUESTION UNANSWERABLE IN A REALISTIC PERIOD OF TIME.

So let's ask a really hard question, where retrieval and comparison of sources and probably processing would all be needed.

Jack fingers began to type, apparently outside the control of his brain, <Is it possible, even if only in principle, to res—

He paused. Not that question. Anything but that. Whatever the answer, he didn't want to know. Josie wouldn't have wanted him to ask. Something equally wild. He raised his eyes from the screen, and saw a videotape of *The Day the Earth Stood Still*, returned in the depository but still waiting to be reshuffled.

<Is it possible to send signals or materials faster than the speed of light?

He had been expecting an instant NO. Instead, the screen filled with a new message: **PROCESSING CONTINUES IN BACKGROUND MODE. OTHER FUNCTIONS REMAIN AVAILABLE FOR USE WHILE PROCESSING IS PERFORMED.**

WHAT WOULD YOU LIKE TO KNOW?

The new system was either very smart, or very dumb. Standard wisdom said nothing could go faster than light. Try another. A hard one.

<Based on all the available evidence, what is the probability that there is life in the universe, other than here on Earth?

No instant answer. Instead, **STACKING QUERIES.**

QUEUE LENGTH IS TWO. PROCESSING CONTINUES IN BACKGROUND MODE. OTHER FUNCTIONS REMAIN AVAILABLE FOR USE WHILE PROCESSING IS PERFORMED.

WHAT WOULD YOU LIKE TO KNOW?

Shortage of sleep was having its effect. His head ached, and his allergies were playing up.

<What is the most effective treatment for a sinus headache.

A LIST OF OVER-THE-COUNTER MEDICATIONS OF PROVEN EFFICACY FOLLOWS. CONSULT A PHYSICIAN IF THE PROBLEM IS PERSISTENT OR FULLY DEBILITATING.

Jack stared at the list. No surprises, he had used many of them.

<When will there be a cure for cancer?

CANCER IS NOT ONE DISEASE, BUT MANY. SPECIFY A TYPE.

<Pancreatic cancer.

STACKING QUERIES. QUEUE LENGTH IS THREE. PROCESSING CONTINUES IN BACKGROUND MODE. OTHER FUNCTIONS REMAIN AVAILABLE FOR USE WHILE PROCESSING IS PERFORMED.

WHAT WOULD YOU LIKE TO KNOW?

But then, almost before that message was on the screen, **THE ANSWER TO QUERY TWO (<BASED ON ALL THE AVAILABLE EVIDENCE, WHAT IS THE PROBABILITY THAT THERE IS LIFE IN THE UNIVERSE, OTHER THAN HERE ON EARTH?>) FOLLOWS:**

THE PROBABILITY THAT THERE IS LIFE IN THE UNIVERSE, OTHER THAN ON EARTH, IS UNITY.

An eye-popping answer.

<Was that already in the data files?

But he knew — why otherwise the processing delay?

THE ANSWER WAS NOT IN THE DATA FILES. IT WAS DERIVED BY A SYNTHESIS FROM SEVERAL MILLION FACTORS IN TWENTY-NINE DIFFERENT SCIENTIFIC FIELDS.

<A probability of unity means a certainty, doesn't it? IT DOES.

<Then where is there life closest to Earth? I don't count people orbiting Earth in the Shuttle or Mir. Is that what you meant by certainty?

THE FORM OF YOUR QUESTION IMPLIED THAT HUMANS ORBITING EARTH, OR LIFE-FORMS CARRIED TO ORBIT BY HUMANS, SHOULD BE EXCLUDED FROM CONSIDERATION. THIS WAS DONE IN ANSWERING QUERY TWO.

Then **STACKING QUERIES. QUEUE LENGTH IS**

AGAIN THREE. PROCESSING CONTINUES IN BACKGROUND MODE. OTHER FUNCTIONS REMAIN AVAILABLE FOR USE WHILE PROCESSING IS PERFORMED.

WHAT WOULD YOU LIKE TO KNOW?

Everything!

Were there lost plays by Shakespeare, like "Love's Labors Won," referred to by his contemporaries? Who was the Dark Lady of the Sonnets? Did Napoleon die of natural causes, or was he poisoned? What happened to Judge Crater and Ambrose Bierce? How was chess invented? Who killed Jimmy Hoffa? What happened to the Dauphin Louis? Is the Thomas Jefferson Beale Cipher genuine, indicating the location of a great treasure trove somewhere in Virginia? Did Fermat really have, as he said, a "marvelous" proof for his Last Theorem? What happened to the crew of the Marie Celeste? Was Anne Boleyn innocent, as she insisted even at the moment of her execution? Did life arise spontaneously on Earth, or was it transported here from elsewhere? What happened to the lost colony at Roanoke? Did the Ten Lost Tribes of Israel really exist? Was there an Atlantis? What was the fate of Einstein's daughter, Lieser? Was Marco Polo at the court of the khans, or did he make up the story in prison? Is cold fusion real? What name did Achilles assume when he hid himself among women? Is the universe open or closed? Is there life after death?

He instructed the system to provide answers in printed form so that he could study them later. Then he typed his questions in a trance, brain moving faster than fingers, until the continuous ringing of the outside bell brought him back to the world.

It was 10:15, the library should have opened fifteen minutes ago. A line of people was waiting, his shoulders and back were aching and tight, and his sinuses were worse than ever.

He stared at the screen. While his attention had been on the clock and the waiting people, he had touch-typed, <Is it possible, even if only in principle, to res—

He stood up, stiff-legged, and went to open the library doors. His apologies to the waiting line were genuine, but perfunctory. He didn't want them there at all. And later, the usual afternoon lull did not materialize. The library was frantic until the last reluctant patron was chivied out at six o'clock.

He walked back to the terminal. The screen said: **ALL QUERIES HAVE BEEN ANSWERED TO THE LIMIT OF SYSTEM CAPABILITIES. FURTHER PROCESSING WITHOUT FURTHER INPUTS WOULD NOT CHANGE RESULTS.**

WHAT WOULD YOU LIKE TO KNOW?

He typed: <You say there is other life in the universe. Is there also intelligence elsewhere in the universe?

PROCESSING CONTINUES IN BACKGROUND MODE. OTHER FUNCTIONS REMAIN AVAILABLE FOR USE WHILE PROCESSING IS PERFORMED.

WHAT WOULD YOU LIKE TO KNOW?

<More on the same subject. If there are other intelligences in the universe, are there any in this galaxy? Where is the nearest one to Earth?

STACKING QUERIES. QUEUE LENGTH IS TWO. PROCESSING CONTINUES IN BACKGROUND MODE. OTHER FUNCTIONS REMAIN AVAILABLE FOR USE WHILE PROCESSING IS PERFORMED.

WHAT WOULD YOU LIKE TO KNOW?

Jack did not answer. He reached for his Out tray, located the cardboard packet that the disk had arrived in, and stared at it. By rights, it should say that the disk came from MAGIC, INC. Instead, he saw a **SPECIAL SERVICES** stamp, next to his own library's name — which he now realized was misspelled. *Fort Macrae*, it said. A simple misprint, for *Fort Maricle*? Or a significant change? It did not say library. And **SPECIAL SERVICES**? Maybe there was an actual Fort Macrae, a part of the U.S. Defense Department. The Zip code was smeared and illegible. He could read only the last three digits. With no point of origin shown, some Post Office worker might have taken a best shot at the place of delivery.

As Jack moved over to the printer he felt a touch of dizziness. He

had asked a hundred questions — for which ones would he now find answers?

The output was a fat pack of paper, an inch and more thick. The temptation to sit down and begin to read was great, but he resisted. He had eaten only a packed chicken sandwich and drunk a hurried cup of hot tea at midday, and for the past couple of years he had noticed that he always became a little dizzy and could not concentrate if he went too long without food. Dr. Kelstrom had tested him, shrugged, and said, "Low blood sugar. Don't go so long between meals. Snack on a chocolate bar if you have to. You have to learn to look after yourself."

Tonight, of all nights, he wanted to be able to concentrate.

He took the listing with him and walked to a Pizza Hut, where he bought a carryout cheese crust pizza and took it home. By 7:15 he had eaten, the dizziness was gone, and he was feeling shakes of quite a different kind.

The easy answer was to conclude that the new query system had bugs in it, and the answers were crazy. He couldn't quite believe that — but he couldn't believe many of the answers, either.

FOR THE QUERY, <IS IT POSSIBLE TO SEND SIGNALS AND MATERIALS FASTER THAN THE SPEED OF LIGHT?>
YES.

1) IT IS NOT POSSIBLE TO SEND SIGNALS FASTER THAN THE SPEED OF LIGHT IN ANY SIMPLY-CONNECTED SPACE-TIME. HOWEVER, THE SPACE-TIME OF THIS UNIVERSE IS MULTIPLY-CONNECTED IN COMPLEX WAYS, CONTAINING WORMHOLES AND OTHER SINGULARITIES. EMPLOYING SUCH NATURAL FEATURES, SIGNALS AND OBJECTS CAN BE SENT FROM ONE PLACE TO ANOTHER IN LESS TIME THAN WOULD BE REQUIRED IF THE CONVENTIONAL DEFINITIONS OF "DISTANCE" AND "SEPARATION" WERE USED. IT IS THUS POSSIBLE TO SEND SIGNALS AND MATERIALS FROM ONE PLACE TO ANOTHER FASTER THAN THE SPEED OF LIGHT.

2) QUANTUM MECHANICS IS NON-LOCAL; THIS FACT CAN BE USED TO SEND SIGNALS (BUT NOT MATERIAL OBJECTS) INSTANTANEOUSLY BETWEEN WIDELY SEPARATED LOCATIONS.

Was that second answer what the system meant by "an acceptable substitute answer to an unanswerable question"? If so, Jack did not agree. Neither answer was acceptable, because both explanations were beyond his comprehension. The next one, though, was quite clear — and for that reason far more disturbing.

FOR THE QUERY, <WHEN WILL THERE BE A CURE FOR PANCREATIC CANCER?>

THE PROBABILITY OF A CURE FOR PANCREATIC CANCER ("CURE" BEING DEFINED AS EQUIVALENT TO THE CURRENT MEDICAL CRITERIA FOR "TOTAL REMISSION") AS A FUNCTION OF TIME MEASURED FROM THE PRESENT IS AS FOLLOWS:

TIME IN YEARS	PERCENT PROBABILITY
1	1
2	3
3	7
4	19
5	53
6	73
7	89
8	96
9	99
10	99

THE UNCERTAINTY ON THESE ESTIMATES AT THE ONE SIGMA LEVEL IS ONE FIFTH OF A YEAR, MULTIPLIED BY THE NUMBER OF YEARS.

The final comment was out of Jack's league, but not the rest of it. He read the page over and over with increasing bitterness. Eight years, three years plus five, might have made all the difference. Ten years, three plus seven, would have provided a near certainty.

He moved to the next page, wondering about yet somehow accepting the validity of what he had just read. He wished that he had never asked. Wasn't the query system supposed to refuse to answer when that was in the best interests of the questioner? How was it in his best interests to know that time had been so cruel to Josie?

FOR THE QUERY, <WHERE IS THERE LIFE CLOSEST TO EARTH?>

THE NEAREST KNOWN LIFE TO EARTH IS AT A DISTANCE OF 34 PARSECS (45 LIGHT YEARS) ON A PLANET ORBITING THE DWARF COMPANION OF THE STAR CAPPELLA. HOWEVER, THERE IS A GOOD CHANCE (PROBABILITY 0.62) THAT SOME FORM OF LIFE IS PRESENT IN THE OORT CLOUD, LESS THAN ONE LIGHT YEAR FROM EARTH.

Now that, he didn't accept. How could the query system make such a definite statement? It didn't say possibly, it didn't say maybe, it didn't offer any suggestion of doubt. The nearest known life to Earth — and the only hedging came because there might be something a whole lot closer.

As weird a reply as you could get. Except for the next ones.

MULTIPLE QUERIES ARE DEALT WITH IN THIS REPLY. THERE IS OTHER INTELLIGENT LIFE IN THE UNIVERSE. EIGHTY-SEVEN INTELLIGENT LIFEFORMS EXIST IN THIS GALAXY. THE CLOSEST TO EARTH IS TO BE FOUND AT A DISTANCE OF 640 PARSECS.

No hesitation, no hint of doubt, just absolute certainty. In that case...

Instead of reading on steadily through the output listing, Jack skipped to the last page. He was interested in answers to every question that he had asked — but at the moment, only one mattered.

FOR THE QUERY, <IS THERE LIFE AFTER DEATH?>

ALTHOUGH THERE IS MORE CONJECTURE IN THE DATA BASES ON THIS SUBJECT THAN ALMOST ANY OTHER, THERE IS NO EVIDENCE OF LIFE AFTER DEATH, WITH THE CONVENTIONAL DEFINITIONS OF "LIFE" AND "DEATH."

That was the obvious answer, the right answer, the only reply he would not have rejected. At the same time it left him oddly hollow inside. What had he been hoping for? A literal *deus ex machina*, offering salvation and eternal life?

Jack went wandering around the empty house, into rooms that these days he seldom visited. Without Josie and with grown children half a world away, this whole place was far too big. A dozen times he had told himself to put it on the market. The Zellners suggested the same thing, each time they came. The house needed too much looking after, they said. They didn't give their real reason: that they thought he would be better away from old memories.

He no longer felt like reading answers on subjects that had seemed so interesting earlier in the day. Despite last night's lack of sleep, he did not feel tired. He felt uneasy, as though some new search-and-retrieval program was operating deep inside his own system.

He went to bed early, against his better judgment, and passed a restless night. More and more, he was convinced that the disk had been sent to him by accident — or at the very least, whoever sent it did not realize what they had created. When they found out, they would surely be over to take away the disk.

In the early morning hours, Jack realized that most not happen before he asked the new system one particular thing.

He was at the library soon after daybreak. He went to the terminal, with its waiting message: WHAT WOULD YOU LIKE TO KNOW?

Yesterday he had dithered, wanting to ask a question and backing away. No more of that. He would be direct. But first there was another question: Would he be able to believe the answer, whatever it was?

He needed a way to add credibility to the incredible.

He typed: <How can this system provide answers about things like the number of intelligences in the galaxy, and the nearest such intelligence? There is no way that any data base can provide such information.

This was not a case where lengthy processing was needed. The answer came at once.

THAT QUESTION CANNOT BE ANSWERED IN TERMS FAMILIAR TO YOU. IN THIS CASE, AN ACCEPTABLE SUBSTITUTE ANSWER WILL THEREFORE BE PROVIDED. QUANTUM THEORY PROVED, LONG AGO, THAT THE UNIVERSE IS NON-LOCAL. THUS, INSTANTANEOUS COMMUNICATION WITH DISTANT LOCATIONS IS POSSIBLE. THE QUANTUM COMPUTER IN THIS SEARCH-AND-RETRIEVAL SYSTEM IS ABLE TO ESTABLISH CONTACT WITH, AND IS NOW IN COMMUNICATION WITH, OTHER QUANTUM COMPUTING SYSTEMS AT ARBITRARILY LARGE DISTANCES. CERTAIN INFORMATION PRESENTED IN EARLIER REPLIES CAME FROM THOSE DATA BASES. INTERACTION WITH REMOTE SOURCES IS LIMITED ONLY BY LOCAL PROCESSING CAPACITY AT THIS SITE. THE KNOWLEDGE TO VASTLY INCREASE SUCH CAPACITY IS NOW AVAILABLE.

That confirmed the conclusion that Jack had come to during his sleepless night. He was dealing with something very different from what the system designers thought they had created. He had an anomaly, an unprecedented scientific breakthrough.

But did he believe the answers that he had been getting?

He did, absolutely and without reservations.

With that conviction came another. He was no scientist. When he reported what the new system could do, or its developers realized where it had been sent, the disk would be taken away. He would never have another chance.

WHAT WOULD YOU LIKE TO KNOW?

Jack's fingers trembled as he typed, not yesterday's indirect: *Is it possible, even if only in principle, to resurrect a person from the dead?*, but the real question.

<How can I bring my late wife, Josie, back to me?

He felt ridiculous as he entered the query. The system wouldn't answer, it couldn't possibly answer. But the words that appeared on the screen seemed more preposterous than the question: PROVIDE YOUR FULL NAME AND YOUR SOCIAL SECURITY NUMBER.

Jack complied with the request, wondering if he or the query system were the insane one.

PROCESSING CONTINUES IN BACKGROUND MODE. OTHER FUNCTIONS REMAIN AVAILABLE FOR USE WHILE PROCESSING IS PERFORMED. WHAT WOULD YOU LIKE TO KNOW?

Infuriating — and astonishing. What could that near infinite computing capacity be doing? But the pause lasted only a few seconds.

FOR THE QUERY: <HOW CAN JOHN JOSEPH MELLON BRING HIS LATE WIFE, JOSIE, BACK TO HIM?

GO TO 365 PERSIMMON ROAD, HINSLEY. AN OPTIMUM ROUTE AND A LOCAL MAP ARE BEING PRINTED.

Hinsley? Josie lay less than half a mile away, in the old Locust Avenue cemetery.

WHAT WOULD YOU LIKE TO KNOW?

<I'd like to know what's going on. Hinsley is way across state, three hundred miles or more. I've not been there in twenty years. Go there, and do what?

The screen would not respond, even when he repeated the question. In the background, the printer was at work. When Jack walked over to it, a route map and travel directions had been printed out.

He grabbed the sheet from the printer, then hesitated. It was a point

of pride that the library should remain open. He went to the phone and called Dilys, the Zellners' married daughter. She agreed to substitute for the day. Ten seconds later he was at the door. He left the library unlocked and the keys where Dilys could pick them up in the book depository.

The urge to drive straight through without stopping was overwhelming, but at midday he was forced to halt for gas. Then he was on the road again. By two-fifteen he was on the outskirts of Hinsley, his memory of the town too vague to say how much it had changed since his last brief visit.

Persimmon Road was a quarter mile of old frame houses. Number 365 needed painting. The front garden was big and well cared for. Jack approached the door slowly, walking along a path bordered by shade trees and bushes of flowering crepe myrtle. There was no bell, but the sound of the old brass knocker seemed to echo along the whole street.

The woman who opened the door was not in the least like Josie. She was slim and neatly dressed, with a pale, tired face whose Eurasian features made her age hard to estimate. Jack guessed she was late forties to mid-fifties.

He stood and stared, knowing that he was making a fool of himself. All the way from Fort Markie he had wondered what he was going to find, what he was going to say. Now every possible opening remark had fled from his mind.

The woman started back at him and shook her head. "I'm sorry," she said. "You're too late."

Too late for what? Jack said, "Oh." He felt totally drained. The woman's face receded, was suddenly surrounded by a border of shifting black before it swam back into focus.

She looked him up and down. "It's a pity, because you're just the right size. I hope you didn't come far."

"From Fort Markie."

Moderate sympathy changed to astonishment. "That's right across state. You drove all that way today?" And, when Jack nodded, "Then I'm extra sorry you had such a long trip for nothing. Are you all right?"

He was not all right, not at all. He reached out to support himself on the door jamb.

"A bit dizzy. It's my own fault. I skipped lunch. I'm not supposed to do that."

"Come in." The woman's hand was on his arm, steadying him. "Sit down right here. You have to get some food inside you. And a cup of hot coffee?"

"I can't—"

"Don't try to talk. Just sit and rest."

He was deposited at a wooden table in a sunlit kitchen, staring through the back window at a garden bright with day lilies, portulaca, and peonies. Behind him, the woman was busy with pans and plates. He felt too weak to argue — and she was quite right, he had to eat something or he would not make it even as far as the nearest diner. He had been an absolute fool to drive straight through.

"I should have done it long ago," she was saying, as though continuing a conversation. "But you know how it is, I kept putting it off. Finally Megs Laird — she's right across the street — came over and told me, 'Caroline' she said — that's me, Caroline Barringer."

She paused. "Jack Mellon," Jack said automatically.

"Pleased to meet you, Jack." She reached over and placed a mug of coffee in front of him. "Help yourself to milk and sugar. Anyway, Megs said, 'Caroline, it's been over two years, and that's more than time enough. It's not good for you. You won't need to do anything, I'll have my Chick do the sorting out. And we'll sell them or give them away, whatever you like.' I told Megs she was right, but I had to help or it would feel wrong. I took her up on the offer for Chick to do the sorting, but I said I'd handle it after that. And I did. This all right?"

A plate loaded with roast beef sandwiches, pickles, and chips appeared in front of Jack as he took a first sip of hot sweet coffee. He nodded gratefully. "It's wonderful. Just what I would have asked for."

"Try a taste before you say that. I used hot mustard. Well, anyway,

Continued on page 96

MICHAEL WHELAN



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A BOOK BY ITS COVER

The Art of the STAR WARS Novels

BY KEVIN J. ANDERSON

MORE THAN VIRTUALLY ANY OTHER FILM in history, *Star Wars* turned a sheer visual experience into an event. When novels continued the stories of Luke Skywalker, Han Solo, Princess Leia, and the gang, the cover art had to be something out of the ordinary. Artists created collages, images, set-pieces that used the familiar icons to capture

the drama of *Star Wars* and make readers dive into adventures they would never see on the big screen. The team of artists drawn together to create the "look and feel" of *Star Wars* novels brings a diversity of styles and techniques that capture the flavor of "a long time ago in a galaxy far, far away." The grand master of *Star Wars* artists, Ralph McQuarrie, has worked with Lucasfilm since the very beginning. McQuarrie's breathtaking concept paintings helped George Lucas to sell his over-the-top film project to 20th Century Fox in the first place, and he is responsible for design-

ing the most familiar trappings from the movies: Darth Vader, See-Threepio, stormtroopers, Cloud City, Jabba's Palace, and many others. Back in 1978, only a year after the release of *Star Wars*, McQuarrie did the cover for the very first spinoff novel, *Splinter of the Mind's Eye*, by Alan Dean Foster. Most recently McQuarrie's work has been the core of *The Illustrated Star Wars Universe*, a gallery of breathtaking paintings published as a *National Geographic*-style coffee-table book.

Others selected to do the covers for the spinoff novels include the artists of



well known *Star Wars* movie posters: Tom Jung (who painted the covers for Timothy Zahn's *Heir to the Empire*, *Dark Force Rising*, and *The Last Command*) and John Alvin (who did my own *Jedi Search*, *Dark Apprentice*, and *Champions of the Force*). The Brothers Hildebrandt, creators of the famous original *Star Wars* theatrical-release poster, have completed an entire trading-card set for Topps based on *Shadows of the Empire*.

The most prolific cover artist of *Star Wars* novels is Drew Struzan, who also painted the posters for *Special Edition* release of *A New Hope*, *The Empire Strikes Back*, *Return of the Jedi*, and the Indiana Jones movie posters.

His distinctive cover art has appeared on Kathy Tyers' *Trace at Bakara*, Dave Wolverton's *Courtship of Princess Leia*, Vonda McIntyre's *The Crystal Star*, Barbara Hambly's *Children of the Jedi*, and her forthcoming *Planet of Twilight*, Steve Perry's *Shadows of the Empire*, Roger MacBride Allen's "Corellian Trilogy," my own *Dark Saber*, Michael Kube-McDowell's "Black Fleet Crisis Trilogy," Kristine Kathryn Rusch's *The New Rebellion*, and the forthcoming paperback "Han Solo Trilogy" by A.C. Crispin, not to mention all six volumes in Paul & Hollace Davids' young readers' series, beginning with *The Glove of Darth Vader*. Struzan is proud that George



PREVIOUS PAGE: Paul Yuill captured a deadly space battle in his cover painting to the first volume of Michael A. Stackpole's *X-Wing* trilogy. **LEFT:** Drew Struzan's portraits of our favorite *Star Wars* stars graced the cover to Roger MacBride Allen's *Showdown at Centerpoint*. **RIGHT:** Dave Wolverton's *The Courtship of Princess Leia* was a *New York Times* bestseller, and Drew Struzan's heroic image was undoubtedly at least partially responsible.





ABOVE: Stephen Youll portrayed the denizens of that bar where everybody knows your galaxy's name for *Tales From the Mos Eisley Cantina*, an anthology edited by the author of the essay that accompanies this gallery. RIGHT: Paul Youll depicted TIE Fighters on the attack in his cover to the concluding volume of Michael A. Stackpole's *X-Wing* trilogy.

Lucas himself has purchased his original paintings. Drew Struzan's cover art for Bantam's *Star Wars* novels will be featured in a new book entitled *Star Wars: The Art of Drew Struzan* due from PFG in June 1997.

Producing so many book covers, each of which must feature the same basic elements but in a recognizably different arrangement, posed special challenges. For instance, when developing the cover for *Darksaber*, Struzan wanted to add the sinister red Imperial guards as a striking visual element—the only problem was that my draft of the novel didn't include any red guards! But after seeing the early painting and talking with Lucasfilm, I rapidly went back and wrote them in.

One amusing near slipup occurred in Struzan's draft sketch for *Shadows of the Empire* (the story that takes place between *Empire Strikes Back* and *Return of the Jedi*) which featured Han Solo prominently on the back cover ... until it was pointed out that poor Han is frozen in a block of carbonite for the entire novel! Struzan's final cover shows a vicious swoop biker in the same position.

For dazzle and color, the most accomplished cover artist is Dave Dorman, an Eisner-award-winning painter of numerous *Star Wars* comics covers for Dark Horse, including both "Dark Empire" series and the first "Tales of the Jedi" series. He is the force behind all eleven Young Jedi Knights covers, written by Rebecca Moesta and myself for Boulevard Books. Del Rey Books also plans to reissue Brian Daley's classic "Han Solo" adventures (*Han Solo at Stars' End*, *Han Solo's Rescue*, and *Han Solo and the Lost*

Legacy) as separate books starting in the fall of 1997, with new covers by Dorman. The complete collection of his *Star Wars* art was recently published as *Star Wars: The Art of Dave Dorman*; wired fans can also check out works in progress on his web site (www.dormanart.com). Two brothers, Steve Youll and Paul Youll, have each contributed covers to the ever-growing shelf of *Star Wars* novels. Paul has painted all four novels in Mike Stackpole's *X-Wing* series, *Rogue Squadron*, *Wedge's Gamble*, *The Krytos Trap*, and *The Bacta Rebellion*, while Steve has done the covers for my three anthologies, *Tales from the Mos Eisley Cantina*, *Tales from Jabba's Palace*, and *Tales of the Bounty Hunters*.

"It was an absolute treat to do *Star Wars*—it was a great part of my upbringing," says Steve Youll. "I see it all as real, not as a cartoon, and I want to paint it that way." Indeed, his anthology covers are so realistically detailed they look like movie stills. "The most painful part was painting all the wrinkles on Jabba the Hutt's skin—I stayed up until three o'clock in the morning to depict him photorealistically ... wondering if anyone else would really notice!"

"Nobody had done those characters in detail like that before. The hardest thing is when you want to do a character without a good shot of him. When I did *Zuckuss* [one of the bounty hunters], all that I got for reference was a black-and-white photocopy." For the *X-Wing* books, Paul Youll painted every microscopic detail of the ships. His intention was to make the covers look like actual scenes from the films. "His jobs were much more demanding than mine!" Steve Youll says.

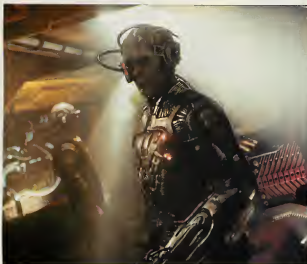
"I'm only glad he got the *X-Wing* covers and I got the *TALES* covers." With the theatrical release of the newly revamped "Special Editions" of the first trilogy, plus the three prequel films currently in preproduction, visions of *Star Wars* will be dancing in our heads. Artists such as these help keep the images in front of our eyes and in front of our imaginations. □





2
P. 96

Prepare to be assimilated at your PC, because the Borg — and Q — have arrived.



ABOVE: The Borg were not content to play villain only in *Star Trek: First Contact*, and so have made their way to your desktop. BELOW: Screen shots from the game provide interstellar excitement aboard both the *Enterprise* (this page) and the Borg ship (next page).

IT IS A REAL PLEASURE TO FINALLY SOLVE A COMPUTER game, particularly one that has been kicking your butt for a week. *Star Trek: Borg* can be solved, and it is great fun along the way. The only thing that stops it from being a must-have-right-now buy for anyone with a PC is its high price tag.

Star Trek: Borg, The Interactive Movie (Producer: Elizabeth J. Braswell, Writer: Hilary Bader, Director: James L. Conway, Star: John de Lancie. Simon and Schuster Interactive, \$49.95) actually contains two products. The first is a multi-media encyclopedia about the Borg called *The Picard Dossier*. Built along the same lines as the *Star Trek: Omnipedia*, the *Picard Dossier* is a clean, interesting program that ran easily and without bugs under Windows 3.1, Windows 95, and Macintosh 7.5. It contains everything you want to know about the Borg up to their appearance in the recent *Next Generation* movie, *Star Trek: First Contact*. Some articles in the Dossier refer to the movie, but there are no pictures or video clips from it.

Despite the slight it pays to the men and women who obviously put a lot of time and effort into researching and writing the Dossier (and whose "Borgified" pictures are contained in the Dossier's credits section), there

isn't a lot to say about it. The Dossier has the advantage over the similar *Omnipedia* included in the *Star Trek: Klingon* package in that most of its information is not duplicated by some previously published (and more cheaply priced) text version. There is no "Borg Dictionary," etc., so the Dossier is the only place to go besides the episodes themselves for the information it contains. If you want the entire history of the Borg in *Star Trek* up until the *First Contact* movie, then you will be pleased with the Dossier.

The second and more interesting (to me anyway) part of *Star Trek: Borg* is the Interactive Movie that takes up most of the three CD ROMs included in the package. In the movie, you play Cadet Furiong, a junior member of Star Fleet who lost his father ten years before in the battle with the Borg at Wolf 359. As the movie opens, the Borg are attacking again and you are being sent out of harm's way. Luckily (?), the omnipotent being Q (played by John de Lancie himself, the actor who has played the role in many *Star Trek* episodes since the role's creation in the pilot for *Star Trek: the Next Generation*) arrives to whisk you back in time to your father's ship so that you can try to save his life and his ship from the Borg.

Many surprises occur along the way in the Interactive Movie, but the first is the movie itself. Shot on video tape, the whole movie plays on your computer in full motion, full screen (640x480), 16 bit, TrueMotion video. If you are used to little one inch square QuickTime videos like those employed in the *Picard Dossier*, it is a pleasant shock when the star ship crosses your whole screen in the movie's opening scene. On my Pentium, Windows 95 machine and on my Mac 6100 computer, the video was both smooth and perfectly synched to the audio. Oddly, on my 9500 Mac, the video was jerkier and less well synched, but still very watchable. The movie gives the real feeling of watching an actual episode of *Star Trek*. The program is, however, an interactive movie, so you don't just watch the action unfold. At key points during the narrative, the action on the screen freezes and a little Borg cube appears. You then decide the course you want the movie to follow by clicking the cube on

something on the screen. For instance, at the beginning, Q gives you the choice of going back in time with him, or staying in the future. You click on either your suitcase (already packed so you can be taken off the ship to safety) or a phaser (showing you're ready to fight). I didn't count the number of decision points there are in the



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movie, but you seldom go more than a couple of minutes without encountering one.

To help you make the right choices, Q has given you a special tricorder full of entries that he narrates himself. At most points in the movie you can pause the action and a spinning tricorder appears. You move it around the screen and anything that it stops spinning over has an entry in the tricorder that you can then call up and listen to. The entries end with



links that take you to more information. You cannot finish the movie without the hints and codes contained in the tricorder, so it is worth calling up early and often.

So much for your role in the movie. What about the other actors? Well, Jean de Lancie clearly had a ball and Hilary Bader wrote him some wonderful lines. Check out the entry for Vulcans on the tricorder. Q shows up everywhere and does everything in the movie. He gives you advice and second chances and boosts you up and tears you down; tricks you and sets you straight. In other words, he treats you just like he has always treated Picard or Sisko or Janeway. It all helps add to the illusion that you really are participating in an episode of the show. Barry Lynch, John Cothran Jr., Marvyn McPhail, and Jeff Allin all do good jobs too in much more limited roles. Their characters grew familiar and real enough that it pained me every time I would screw up and cause their deaths, or worse, cause them to be "Borged."

The movie is constructed from two hours of video, and like the old pick-your-path adventure books of which it is a direct descendant, you will find yourself knowingly making the wrong choices just to watch the video of what happens when you do. (I personally recommend that you screw up entering the turbo lift codes at least once so you can view a nice little homage to the Original Series.) More often you will find yourself making the wrong choices unknowingly. The movie is very forgiving. If the play doesn't lead you around a problem by itself, it simply takes you back to the point where you guessed wrong. There are only a few choices out of dozens that actually end the movie with you losing.

So, the Interactive movie is fun. It feels like being in a *Star Trek* episode. The controls are so simple that anyone can play it. Still, the movie is built from two hours of video. It begs the question, "How long does it actually take to play, and do I want to spend fifty bucks for it?" I can answer the first question by saying it took me nine hours over six days to finally

solve the game. Part of that time was because I got stuck on the puzzles in the game itself, and part of it was because I kept running into technical glitches.

As I said above, the video ran smoother on my 6100 Mac. Unfortunately, on my 6100, whenever I called up the tricorder and then tried to put it away, the game crashed and I had to reboot my machine. This, I discovered on the Web page, is a known error and the patch is underway, soon to be posted.

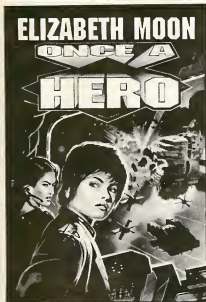
Another type of glitch occurred at interactive entry points. There are four points during the movie when you must enter codes in an on-screen pad. You click on the first number and the Borg cube pointer spins faster, telling you it is in "input" mode. On both my Macs, the game wouldn't go into "input" mode. Instead it would kick me out of the decision point as if I'd entered the wrong code. The game will take you past this error (eventually) the first time you need to enter a code, but the second time you will loop forever until the bug is fixed. Tech support tells me that this is a known bug that only occurs on some Macs, and that they are working to create a patch.

The good news is that the tech support number for Simon and Schuster Interactive is toll free. The bad news is that the game is so new, most of the techs haven't played it. Mainly what they can tell you is what is on the web page, so if you're on the World Wide Web, you can probably save yourself a call. If the techs tell you that they are going to try something and they'll call you back, they won't. There is an e-mail address on the web, but no one responds to messages sent there. If you have a Mac, I'd either wait to buy until the two patches are on the web page, or else save the receipt until you see if your machine crashes as mine did. If you have a Pentium 96 machine you are on much safer ground. If you can get the program to run, my guess is that it will take you about six hours to finish the movie and then you can pass it on to your friends who don't usually play computer games, but who like *Star Trek*. (My wife hates computer games, but she was having a great time with this movie, until we hit the "input mode" glitch.)

Against a seven dollar movie ticket, fifty dollars for six hours of fun seems like a lot of money, but compared to sixty dollars for a three-hour theater play, it doesn't seem so bad. Against the 50 hours of game play you might get from a computer game like *Myst* or *Duke Nukem 3D*, fifty dollars seems like a lot again, but I think that *Star Trek: Borg* is more properly compared to first two examples. You're not exploring a world like you are in *Myst* or blowing one up like you are in *Duke Nukem*. You're watching a story as you would in a movie theater, except that you are a part of the action. *Star Trek: Borg* is a long way from the holosuites of the *Star Trek* series (a long way), but it aims in that direction. Like a play with no fourth wall, the interactive movie is a narrative that includes the audience, and like many of those plays, it is great fun. □

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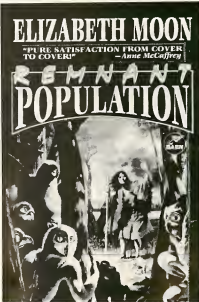
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BOOKS

Continued from page 16

us. As with so many other themes, Robert A. Heinlein's work can give us a great example. Lazarus Long is the perfect hero, completely exemplifying the first situation. He can do anything and learn anything. Appearing in a large part of Heinlein's work from *Methusalem's Children* and *Time Enough for Love* to *The Cat Who Walked Through Walls* and *To Sail Beyond the Sunset*, Lazarus isn't the only hero in these books — one of the complaints about Heinlein's later works is that everybody is the same: Perfect. These books are a lot of fun. There's action and witty dialogue and evil enemies. But it is clearly fiction.

The world changed, and again. Heinlein can show the shift. In *Glory Road*, Heinlein's hero Oscar Gordon develops the "accidental, troubled hero" theme. Oscar's father died (heroically) when he was a child, his mother raised him alone and poor until she remarried. Oscar struggled to finish college and ends up in the military and in the Vietnam War. When he is finally discharged, he is bumming around Europe trying to find some peace when he reads an ad for a hero. Knowing he's not a hero, and angry that the ad described him physically, he follows up on it. And finds himself leading a merry band of good guys on an impossible quest in another world and dimension. By the end of the book, he's not only achieved the quest and won the girl, but he's discovered that he's a winner. Once you are a hero, self-doubt and character flaws disappear.

But today even this type of hero is rare, and seems dated, even in military science fiction, where courage abounds. Heroes are having to be reinvented. Elizabeth Moon succeeds wonderfully in *Once A Hero*, a part of the "Heris Serrano" world, but able to stand alone.

Esmyr Guiza is our hero. Extremely smart, talented, and athletic, Esmyr is haunted by nightmares of events her family insisted never happened, and, after circumstances force her to command a ship and crew and save Heris Serrano from a traitor, she has even more nightmares. After the obligatory and grueling court marshal, which clears her of wrongdoing, Esmyr visits her home world for the first time in ten years. A woman now instead of girl, the sexism of Allipano and the rigorous family rules stifle her as well as comfort with familiarity. But an old family retainer lets the secret escape: her nightmares are real. Her family — her beloved father — has been lying all these years. Her family vacation has become nearly as horrific as the battlefield. When she gets back to active duty, all she can feel is relief that she's drawn a nice, safe, boring slot aboard the Koskuisko, a deepspace repair ship.

Only it doesn't stay boring for long. Trouble is brewing both from "trader thieves" on board and the Bloodborne (vicious enemies of the Familias) who are using the thieves as dupes. At all costs the Koskuisko and its crew

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SCIENCE

Continued from page 38

increase in sensitivity and reliability.

KONDO: First, periods in close binary stars can be shorter than a day. In fact, a fraction of a day. Therefore, it is not inconceivable for a planet to be so close to its primary that its period would be just a few days, as in 51 Pegasi. Second, it's been also well-known that some binary stars have highly eccentric orbits. In standard models for formation of planetary systems, theorists have assumed circular formations at the beginning. It's the simplest way to do it. It does not mean that we cannot form eccentric orbits for planets.

SHEFFIELD: We're not specifically talking about the possibility of life-bearing planets here, but if I can say a few words about that, one of the things you would like is that the primary star about which you find the planet orbiting is close to the solar type of the sun, which is a G2 dwarf. The reason is, if you have a big supergiant star, even if you have a planet around it there is not enough time for life to develop. The supergiant will run through its entire life history and disappear and explode too quickly. So we are most interested in extra-solar planets around stars which are close to the sun in spectral type. And 51 Pegasi is such a star, which makes it especially interesting. I'm sure that people will now be looking at residuals, the small signals left when you've removed the signal caused by a planet, to see if there's any second signal. One of these extra-solar systems looks as if it has at least two planets. But they're both big. It's nice to be able to discover a star with a planet around it, but that becomes much more interesting if you can discover a star with several planets and a distribution of sizes. Then we have a hold on the fact not only are there planets around other stars, but those planets have a distribution of sizes just as our planets do. We don't have that yet. We still consider ourselves lucky to have any planet around another star.

KONDO: May I say just a little more about the primary star? If the star is very massive, say, an O type star, a few tens of times more massive than the sun, it can run through its life cycle in the matter of a few million years. Now if you decrease the size of the star to spectral types B, A, and F, the life expectancy is prolonged. But if you remember how many years it took for life to have developed on this planet, then we'd like to think in terms of at least several billion years for life to have evolved to a point of interest to us. That's why we keep talking about G type stars. Why not a less massive star, which may have a longer life span? The reason is that if you get to lower mass stars, they tend to be unstable. Some are flare stars. That's the reason why we tend to favor G stars. Of course, we could be wrong. Life could be evolved faster under some instances, in which case we should be looking at F spectral types or even A spectral types.

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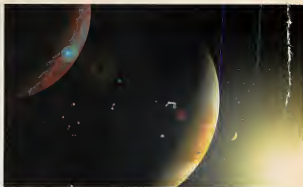
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ABOVE: The extra-solar planet 52 Pegasi is unique, with an orbital period of 4.3 days.

SHEFFIELD: Interestingly enough, we keep pushing back the time at which life is believed to have arisen on this planet. It used to be 3.6 billion years, but now people are saying it's more like 3.8 or 3.9 or 4 billion years — which is only a half billion years after the Earth was formed. We don't know how long life takes to start, and we don't know how life starts either. However, if we want to be on safe ground, we say that we know life developed here, and therefore if we can find a planet around a star of our spectral type, we improve our chances of seeing life there. That's about all we can say. It's weak evidence.

KONDO: If the primary star is really massive, then the detection of a planet becomes even more difficult. It is difficult enough for sun-sized objects. Therefore, there would be technical preferences for detecting planets around less massive and less bright primaries.

SHEFFIELD: One thing that has happened is that people are becoming much better at masking out the light from a primary star through the use of devices known as apodizing disks. Second, our ability to compare timing of signals has become much, much better. So for instance, interferometric techniques are now powerful and very routine. A telescope is limited by the size of its objective — the size of its lens or mirror. However, if you put recording instruments far apart, and you also record not just the intensity of the light but the phase, you can create interferometers. That allows you to create what amounts to a telescope with a mirror size equal to the distance between the portions of the interferometer. If you put a large number of interferometer units in there, you start to build up an image just as you would with a telescope, except that the apparent size of the observing instrument is then the total distance of separation of the components. Toji and I wrote about this years ago, in an article about a "Distributed Observation System," as we termed it, which could be a set of mirrors or any set of recording instruments in which phase is measured. An Inter-

ferometer would give you resolutions far higher than anything we have today. Far higher, meaning orders of magnitude higher. Today, the largest telescope is the ten meter Keck telescope in Hawaii. But it's very easy to make an interferometer array in which the separation of components is many kilometers, and therefore the effective resolution of the instrument is that much greater. You may have read that people have observed sunspots on the star Betgeuse, which is about five hundred light years away. They haven't seen those, in the conventional sense. What they've done is use interferometric methods to produce an image of the disc of Betgeuse, which shows sunspots. These are indirect techniques, which I think will become much more important. And then, third, as we've mentioned already, we will increasingly — cross your fingers — have telescopes in space, which do not have the problems of the atmosphere that we have on Earth, and generally provide a much more stable and quiet platform from which to do observations.

KONDO: There is a project at Mount Wilson, where an array of five telescopes, each with one meter aperture, will be deployed. The maximum separation would be about 350 meters, and this array is going to produce an image resolution of about 10 to the minus 9th radian. I prefer to use radian rather than the traditional arc-second. If you use radian and multiply it by the distance to the object, you have the resolution at the destination; it's easy to figure things out that way. They will be using adaptive optics, so the image quality should be excellent. They are already using adaptive optics at Mount Wilson on the 100 inch telescope, which is now producing images that are comparable in some instances to those obtained from the Hubble space telescope.

SHEFFIELD: We keep saying something without explaining. *Adaptive optics* — we've used the word several times. People sometimes ask what came out of the Star Wars pro-

grana. One of the things that came out of it is the idea of adaptive optics. Adaptive optics allows you, by having an active laser system which you shine upwards, to compensate for atmospheric turbulence. In other words, it tells you how the atmosphere is jiggling the signal you're receiving. So if you put adaptive optics down on the ground, you can take out these wiggles that the atmosphere is introducing into the ray coming down to you from the star or planet, which means that you can improve the resolution to what you might get if you were outside the atmosphere. We still cannot quite do that. We cannot get back everything. But more and more, people are using ground-based systems and adaptive optics to adjust the signal you receive, and obtaining resolutions far better than we could ever get before. There's a 200 inch telescope at Mount Palomar which has the light gathering power of a 200 inch telescope, but only has the resolution (the degree of detail it can see) of a ten or twelve inch telescope. The rest is lost because of atmospheric turbulence. That's why the Hubble, only half as big as the Mount Palomar telescope, is able to produce much sharper images. If we could do complete adaptive optics at Mount Palomar, perhaps we could do something better than the Hubble, but on the ground. I don't know if anyone's proposing that. You know?

KONDO: Not yet. Maybe because it's still doing productive work. In the case of the 100 inch at Mount Wilson, well, it probably wasn't quite that critical to keep it as it had been anywhere, so I think that they were willing to gamble. But because of the success at the 100 inch, they may in fact start thinking about doing that with the 200 inch, too. They will be testing the interferometric telescopes at Mount Wilson before the end of this century. Georgia State University is involved in this. Now NASA is testing technologies for interferometry in space using free flying satellites. This is an extremely delicate and difficult technology because you have to know the relative positions of the component satellites to an accuracy of tens of angstroms. They need to know the separations accurately so you can mix the optical signals. This technology is being tested, and perhaps we'll have such technology available early next century.

SHEFFIELD: There seems to be a rule that anything that depends only upon electronics is going to happen fast. Progress in electronics, timing accuracy and positional accuracy goes on with apparently no limit to how well we can do. We aren't trying to control the position here. We're trying to confirm the positions, determine the positions.

KONDO: Exactly. And as the wavelength gets longer, the accuracy needs not be as stringent. If it gets shorter, the accuracy has to be very stringent. Interferometric x-ray telescopes are possible, but you need to know the separations very precisely, to the accuracy of an angstrom or better. For infrared, you can relax that requirement. This is one reason why interferometry in radio fre-



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quency has already been done using a telescope in space connected electronically to a telescope on the ground. Now the moon is an immense optical bench in vacuum. That is to say, if you set up an array of telescopes on the moon, you can know the separations with any desired accuracy, so to speak. When we have inexpensive SSTO space ships to get to low Earth orbit, the trip from there to the moon can become much less expensive. We can then talk about interferometric telescopes on the Moon. We can have separations of kilometers, even tens or hundreds of kilometers if necessary.

SHEFFIELD: What we're saying, I suspect, is that the pacing item is not the technology. We know what we can do technologically. As usual, the pacing item is budget. I hope that the ice on the moon, primitive life on Mars, and extra-solar planets will combine to make people interested enough to want to do some of the things that technologically we know we could do today, if we had a free hand with the budget. But putting that in context, exploration programs are looking at hard times in NASA. It's not going to get easier in the next five years. It's going to get harder.

KONDO: This is not improper. The public has the right to expect some sort of return for their investment. And I think it's up to the scientists to inform the people who don't work in the field. What we do can be, and should be, appreciated by the public. We should make efforts to translate even esoteric scientific results in such a way that the public can also understand and become supportive. We need to justify the space program in terms of more immediate returns, be they psychological, mental, spiritual or in pragmatic terms.

SHEFFIELD: Detection of planets will always be subordinate to other things of more immediate interest, until we reach the point where we can go to those extra-solar planets. And we're a long way away from there. I don't know how far. Maybe centuries. Until that happens, the extra-solar planets are a high unit of academic interest, but they're not of the same degree of interest as "What will I have for dinner," or "Will I live to be a hundred?" That is what people are more concerned about. If we could say, by going to space, we will have things that do let you live to be 100, in good health, then we'd really see people to react.

KONDO: I will say that unless we have resources from space available, I don't think our future looks particularly good. In which case, its almost moot to talk about living to 100 in good health, because we are assuming a fairly sound economic basis within which context we enjoy living to be 100.

SHEFFIELD: But most people would take the chance on the economic conditions if they had the chance to live to be 100.

KONDO: You are right Charles. However, I think we need to provide for the future of the human race by exploring and exploiting space. It's one of the only chances we have got for a brighter future. □

SCIENCE FICTION AGE BACK ISSUES

November 1992—Fiction by Castro, O'Neill, Malberg, Andrews, DiFilippo, Nelson, Webb. Gallery written by Ray Bradbury on the art of Robert McCall.

January 1993—Fiction by Disch, Watt-Evans, Boston/Fraser, Landis/Strauss, Cross, Daniel. Essay by Marion Zimmer Bradley. Gallery—James Gurney—Dinotopia.

March 1993—Fiction by Ellison, Andrews, Bova, Albridge, Hirsch. Essay by Harlan Ellison.

May 1993—Fiction by Malberg, Tilton, Bova, Steele, Antman. Essay by Robert Silverberg. Gallery: Barlowe

July 1993—Fiction by Piers Anthony, Sheffield, Shelley, Hogan, Ellison. *Jurassic Park*. Gallery of Jim Burns

March 1994—Fiction by Parks, Tiedemann, Popkins, Spaldford, Lass, Garmet.

May 1994—Fiction by Benford, DiFilippo, Morrosio, Albridge, O'Neill, Saramonko. Gallery of Bob Eggleston art.

July 1994—Fiction by Landis, Rich, Wilbur, Malberg, Shelly, Hood. Gun Control essay by David Brin.

September 1994—Fiction by Marcus, Boston, Wilson, Nelson, Sheskin, Landis, Castro. Essay by Frederick Pohl.

November 94—Fiction by Resnick, DiCharis, Flery, Cleary, Moon, Nelson, Brin. Gallery by Harlan Ellison.

January 95—Fiction by Castro, Evans, Steele, Hood, Menison, Clayton. Gallery by Mike Resnick

March 95—Fiction by Wilbur, Saramonko, Albridge, Rich, Jeffrey Carver.

May 95—Fiction by DiFilippo, Ben Bova, Rich, Cleary, Benford, Clayton.

July 95—Fiction by Tiedemann, Feeley, Mackay, Hogan, Millitello, Boston, Koistma.

Sept 95—Fiction by Soukup, DiFilippo, Watkins, Boston, Hood, Parks.

Nov 95—Fiction by Castro, Elliot, Tilton, Yangue, Menison, Clough, Baxter

Jan 96—Free Art Gallery, fiction by Turzillo, Steele, Baker, Webb, Brin, Gurne.

March 96—Novella by Benford. Fiction by Watson, Nelson, Sapich, Stevens, Bishop. Richard Powers Gallery. MST3000 movie.

May 1996—Novella by Landis. Fiction by Elliot, Yolen, Goodman, Baxter, Hood. Steve Yaffa Gallery.

July 1996—Novella by Baxter. Fiction by Williamson, Reed, Michael Bishop, Jerrings, Castro, Sci-Fi Poster Art Gallery.

September 1996—Novella by Shoverberg. Fiction by Debusa, Rich, Jablokow, Choi, Knight, Cleary. Mordant Gallery.

November 1996—Novella by Baxter. Fiction by Stewart, Sheffield, McHugh, Constantine. Gary Freeman Gallery.

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Powerful new cards like Relentless Assault bring *Visions*™ to the fore of Magic: The Gathering®. The epic story of Jamuraa continues with this limited-edition expansion. *Visions* maximizes the strategies introduced in the *Mirage*™ stand-alone and brings new power to any Magic deck. With innovative cards and evocative artwork, *Visions* is the expansion to see.

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